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MARCH, 1947

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VOL. 33 MARCH, 1947 No. 3

Original Articles

CONSERVATISM IN ORTHODONTIC PROCEDURES AND APPLIANCES

LOWRIE J. PORTER, D.D.S., NEW YORK, N. Y.

IT IS a great privilege for me to appear before the Great Lakes Group, for this meeting with you is like an "old-home week" to me. Michigan is my home state; my grandfather was a missionary to the Indians for about fifty years in Northern Michigan, long before roads or railroads appeared in that part of the country; and my father practiced dentistry in Michigan for forty-five years. Though he was an old friend of Dr. Edward H. Angle, my father never practiced orthodontics. I consequently grew up knowing nothing about the branch of dentistry in which you and I are so vitally interested.

Upon graduation from high school I secured work in Toledo, Ohio, and there I met one of our great pioneers of orthodontics—Dr. Burt Abell. It was through him that I became interested in the specialty; textbooks on orthodontics were loaned to me by Dr. Abell and were religiously studied for two years before I entered dental school. My eventual entrance into the University of Michigan School of Dentistry was with the definite idea of taking up orthodontics as a specialty.

I will always remember my father patting me on the back when I graduated from college and saying, "Well, Lowrie, you probably know more about dentistry today than you will ever know again in your life."

That phrase has been in my mind constantly through the years. I never forget it and how true I have found it to be. As I have watched the various

Presented before the meeting of the Great Lakes Society of Orthodontists, Rochester, N. Y., Dec. 2 and 3, 1946.

phases and changes in orthodontics during that time, I realize more and more that we probably don't know it all yet.

There have been great swings of the pendulum in regard to what should be considered good orthodontic treatment. We are in one of those phases today, but fortunately these great swings of opinion eventually settle back into more conservative channels.

It has been most interesting to watch these swings of the pendulum and to follow the various orthodontic developments during those years: the Angle E arch with ligatures tied to each tooth, with resultant gingival troubles; the Jackson removable appliance to avoid the necessity of ligatures; the pin and tube appliance, rather harsh in treatment and difficult to handle; the Mershon half-round tube lingual appliances with auxiliary springs which exerted delicate pressures but were lacking in individual tooth control; the ribbon arch which was also quite harsh and positive in aciton.

The edgewise appliance followed, and was introduced by Dr. Angle in June, 1925, in a paper entitled, "The Latest and Best in Orthodontic Mechanism." Its use was improved to Dr. Hawley, who suggested the use of a round wire in place of the rectangular wire in starting cases.

Lloyd Lourie produced masterful work with the high labial arch, and combined the use of linguals and high labial appliances.

Some orthodontists banded all of the teeth; others banded very few. The latter became so lax in treatment that little attempt was made to finish cases correctly.

Distal occlusion cases were often only half treated. Relapses were frequent.

I was baffled by the variation in opinions of our leading orthodontists, but I tried to follow along, using methods which I believed to be reasonable and rational—a sort of "middle-of-the-road" procedure.

I used various types of appliances which I thought were suitable for various case treatments. I did not hesitate to band teeth when needed. I tried to avoid banding all teeth that did not need banding.

I was torn between various theories—some thought there should be slow tooth movement using very light spring pressures which gradually directed the teeth in their natural growth tendencies; others felt that this was only a "jiggling" of the teeth and was more destructive physiologically to oral structures than banding the teeth and moving them rather positively and quickly into their correct positions in a few months' time.

I recognized that many desirable tooth movements could not be accomplished with only lingual and labial arches. The ribbon arch or pin and tube technique would accomplish these movements but exerted too harsh pressures to fit in with my belief in the desirability of gentle pressures and slow tooth movements.

Orthodontic treatments frequently ran into extensive periods, while patients, as well as their dentists, were getting discouraged and frequently disgusted with orthodontic efforts. Most orthodontists were definitely opposed to extractions under any condition and would not recognize that extraction might be warranted in certain cases.

My first sight of Dr. J. Lowe Young was when he discussed a paper by Dr. Calvin Case on extractions in St. Louis in about 1916. Dr. Case, who was over 70 years of age at that time, had shown some fine results through tooth extraction. Dr. Young was one of our greatest orthodontists. He was conscientious, accurate, and most particular in his treatment methods, but violently opposed to extractions. He believed any extraction was against the intent of nature and that extraction as an orthodontic aid was a definite criminal act. If I remember correctly, Dr. Young, in his very blunt, positive way, said, "Dr. Case, I have enjoyed your paper but I want you and this audience to know that I think you have done more harm today than you have ever done good in your whole life."

It was a surprising and rather harsh discussion, but we can see the soundness of his thoughts. He feared that dentists throughout the country would read Dr. Case's report and that there might be wholesale, promiscuous, unwarranted extractions for orthodontic corrections. He realized that the few cases that might benefit by extraction would not warrant the harm that might result for others who might be innocent victims of unwarranted extraction procedures.

It is possible that an extraction may have been less beneficial at that time than it is now, for appliances had not been developed to carry on the treatment properly after the extraction had been resorted to.

I have taken several postgraduate courses to try to improve my knowledge of orthodontics. Several years ago I had the privilege of taking a course with my very good friend, Dr. Joseph E. Johnson, on the twin wire mechanism. I was greatly impressed by this appliance, for I could do much with it which had been difficult with the labial and lingual appliances. I have used it in a great many cases with great satisfaction. In other cases, the labiolingual technique worked very satisfactorily.

I saw, with great interest, Dr. Charles H. Tweed's first exhibit of consecutively treated cases. Very difficult cases were being beautifully treated with the edgewise mechanism. I could not quite come to the idea of having to band all teeth in every case, but realizing that I still had much to learn, I became very anxious to acquaint myself with the Tweed technique and philosophy.

The course on this technique given by Dr. Robert H. W. Strang was one of the finest courses I have ever taken. The time was crowded with a great amount of valuable instruction. I learned a great deal and crowded my mind with a vast amount of material and with suggestions which I wished to weigh carefully and to think through thoroughly in order to justify any procedures that I might follow in the future.

Whether we fully agree with the extraction theory or not, we cannot help but agree that two of the most honest, conscientious, and progressive men in our specialty are Dr. Tweed and Dr. Strang. I have heard the Tweed philosophy severely criticized by some of our leading orthodontists, but I cannot resist the feeling that any man who can show such excellent results in as many *consecutive* cases as Dr. Tweed has done cannot possibly be all wrong, for

such results have never been shown before, and I am sure that I could not do likewise.

However, even after completing the Strang course there still seemed to be puzzles ahead for me, and I still felt that orthodontic failures were going to occur regardless of the methods used. We do not know it all yet.

I believe it is only by extraction in some cases that we are to come closer to the ideal, but I do not believe that we are fully aware of the eventual results of extraction, and for that reason I want to urge a general feeling of conservatism until we have a definite, positive proof of justification for such high percentages of extractions as have been advocated.

I do not believe that even Dr. Tweed and Dr. Strang are definitely sure that the future trend in orthodontic therapy will warrant the high percentage of extraction which has been suggested, and, if it does not, I am sure they will be the first ones to admit it. The greatness of a man is shown by his willingness to admit mistakes and by his desire to pioneer in the correction of mistakes even though his remedy may seem at first to be drastic.

In Dr. Tweed's differentiation of cases as related to the Frankfort-mandibular base plane angle, he states that about half of the cases in the 16- to 28-degree range will need extraction and that the prognosis ranges from excellent to good. It will necessarily take time and experience to know just which of these cases will need extraction and which will not. Some are going to be on the debatable borderline and it is in these cases that I believe we must wait for further clinical evidence. In time, we may all feel that extraction in 50 per cent of these cases is not enough, or we may possibly prove over a period of time that the percentage is entirely too high and that it was unjustified. This is too serious a problem for us not to exercise a definite feeling of conservatism until more clinical proof has been exhibited. Reports of extraction cases showing the results months and years after treatment, such as was given by Dr. Sam Lewis at the 1946 midwinter meeting of the Chicago Dental Society, will be the determining factor in deciding the limitations of justification in the extraction philosophy.

If the future of these test cases proves that extraction is justified, then we should all, regardless of our feelings of conservatism, admit that we have been wrong in our former practices; but, for the time being, until these cases have been tried for a longer time, we should use care and caution and let the balance wheel still keep balancing our judgment. I believe the time will come when we can know in just which cases extraction is advisable, but at the present time there is a great variation of opinion on individual cases by men who are following this philosophy. So it still becomes a matter of personal opinions, some of which are bound to be wrong, regardless of how conscientious the operator may be. Only through clinical experimentation will we secure sufficient evidence to prove the point in these borderline cases.

The fact that many of our cases have not reached the absolute ideal which we would desire does not, in my opinion, warrant this high percentage of extractions until we are sure that these extractions are not going to lead into other and possibly greater difficulties.

I would like to show you fourteen cases which I have been able to follow several years after treatment. These are all cases in which no extractions were resorted to. (Five of these cases are shown in Figs. 1 to 5.)

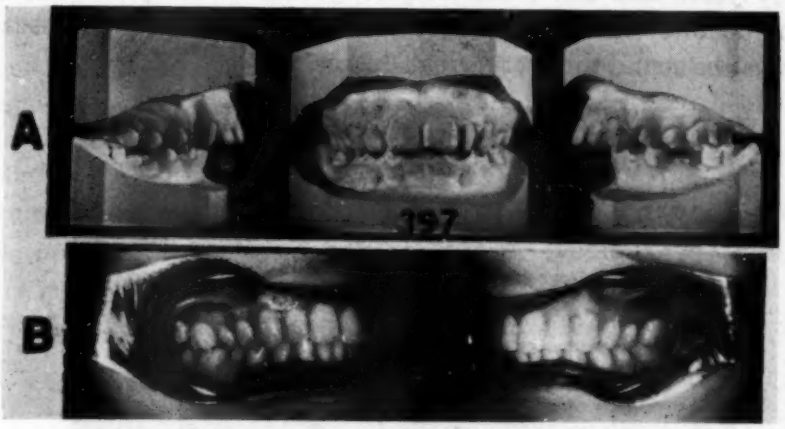

Fig. 1.—*A*, Class II case treated at 11 years of age. *B*, Photograph of teeth taken twelve years after retention.

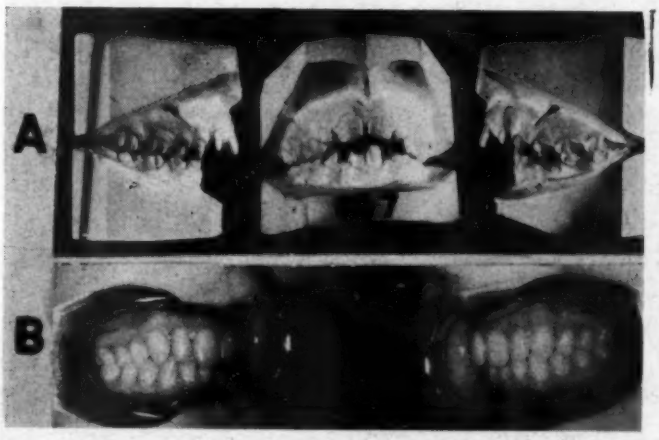

Fig. 2.—*A*, Class II case, lower lateral incisors in linguoversion. *B*, Photograph of teeth taken five years after retention.

While these few cases have well withstood the test of time, they are not consecutively treated cases such as Dr. Tweed has shown. You may believe that some of these cases would have been more successful had I resorted to extractions, but at the time these cases were treated, extractions were not thought of to the extent to which they are now considered. We must all admit, if we are honest with ourselves, that we have seen many other of our cases after retention has been discontinued which have relapsed so greatly that the teeth have returned to practically the same positions as before treatment was started. We have heard those who severely criticize new methods but still are willing to stay in the same old rut. If some of our cases are failing, then we must try our utmost to be able to recognize those cases before treatment is started.

It would be far better for us not to treat cases at all than to accept payment for results which cannot be maintained. When a man as honest and conscientious as Dr. Strang can practice and preach against extractions for over thirty years and can then, completely and suddenly, reverse his beliefs because of definite clinical evidence shown to him, then I feel that this philosophy must be sound to a very great degree.

Fig. 3.—*A*, Class II with deep overbite. *B*, Face before treatment and three years after retention. *C*, Photograph of teeth three years after retention.

I was glad when Dr. Tweed came out with the extraction theory, for there has been no question in my mind for many years but that extraction in some cases is justified. I have been able to get and hold results with extractions which I had never been able to get before, but I still have relapses and I

think I always shall, for relapses are going to occur whenever we have failed to place the teeth in such positions that they will not be subjected to unequalized forces of nature over which we have little, if any, control. Stability will only result if the teeth are in such positions that there is an absolute balance of muscular pressures.

Orthodontics is at a serious crossroads. We must be willing to admit our failures and attempt to correct them if possible. We must use drastic methods if necessary, and I am sure they are necessary in many cases, but my one plea is this—before becoming too drastic, let us be very cautious for fear that through our enthusiasm we may have let the pendulum swing too far to the left.

There are unquestionably cases in which the cuspids have been crowded completely out of the normal arch and in which our only possibility of success depends upon the extraction of four premolars. Most of us agree on that procedure.

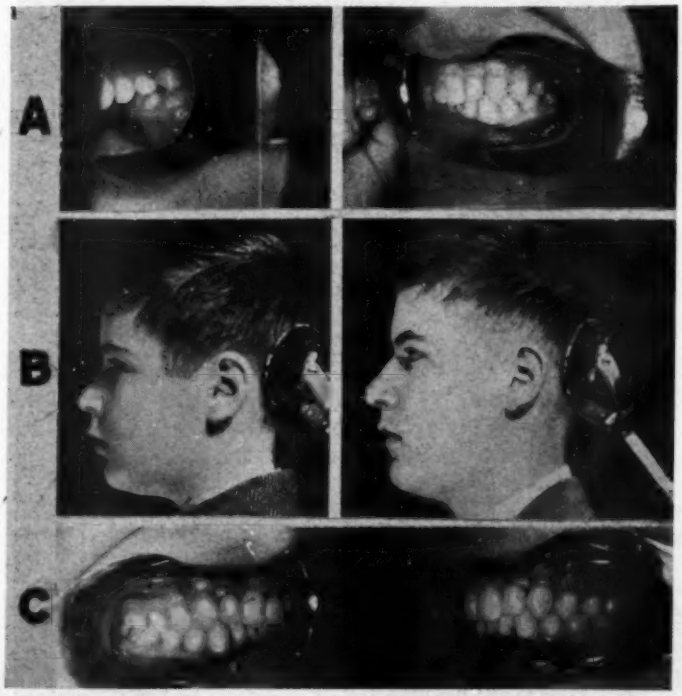

Fig. 4.—*A*, Teeth before and after treatment. *B*, Face before and after treatment. *C*, Teeth five years after retention.

There are other rather exceptional cases in which extractions are justified. Fig. 6 illustrates a case in which the upper first premolars were extracted to reduce a maxillary prognathism and the lower central incisors were also removed because they were completely outside the mandibular arch and without any bony support (Fig. 6, *B* and *C*). Such extractions should not be made, however, until after these teeth have been removed from a plaster cast and the plaster teeth reset to determine the possible eventual occlusion if extractions are to be undertaken.

Fig. 5.—*A*, Class II casts. *B*, Face before and after treatment. (Note change in short upper lip.) *C*, Profile before and after treatment. *D*, Photograph of teeth four years after retention.

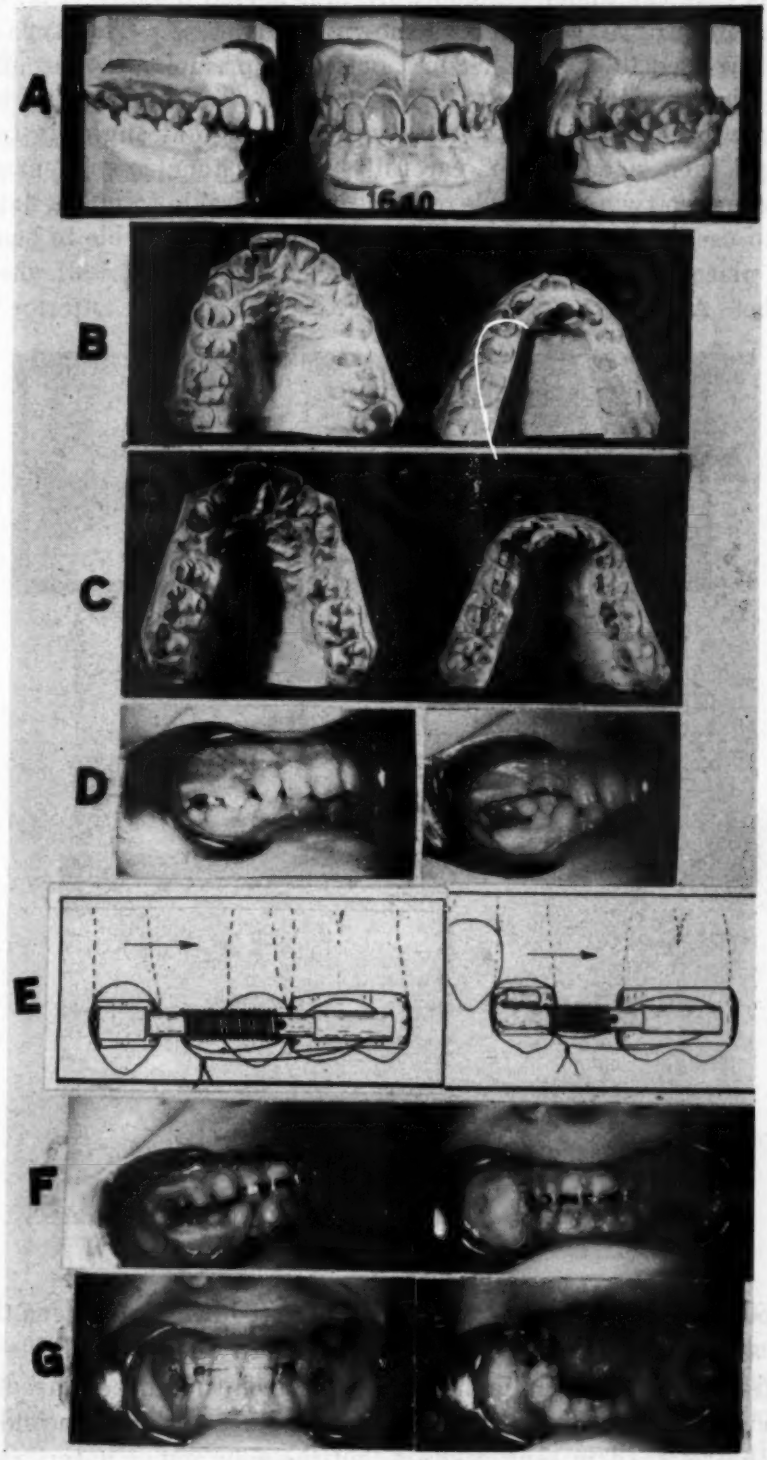

Fig. 6.

In this case the upper cuspids were first moved distally (Fig. 6, *D*) with a sliding section of a twin arch as shown in Fig. 6, *E*. This type of sliding device can be used to close either first or second premolar spaces. The section is free to slide distally through the molar tube. The anterior end is attached to a Johnson bracket by bending the twin wire at right angles in front of the bracket and then smoothed off carefully with a stone to prevent scratching of the lips on the twin wire ends. It is often advisable to pull a flat wire into the tube to use in place of the twin wires as this is less liable to bend. A coil spring is placed on the sectional appliance and stopped well ahead of the buccal tube. A ligature wire is then twisted over the arch anterior to the coil

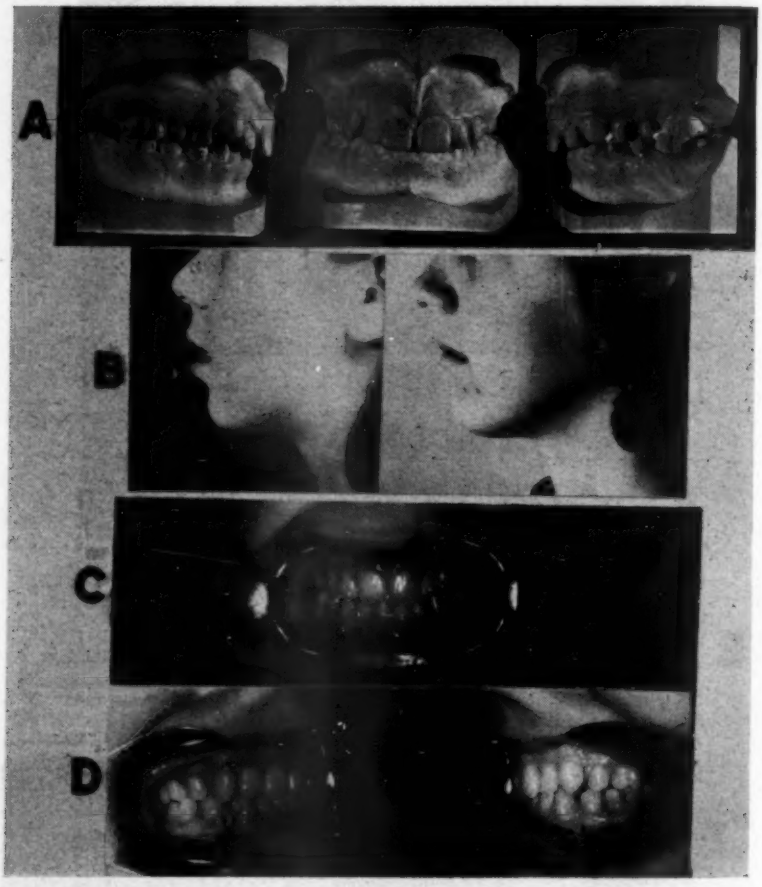

Fig. 7.

and is brought back of the buccal tube and ligated, which tightens the coil and produces a distal bodily movement of the cuspid. If it is desirable to prevent a forward movement of the molar, a lingual arch should be placed to contact the upper incisors. After the cuspid is in contact with the second premolar, it should be retained in that position and the four upper anteriors should be moved back with some type of labial appliance. In Fig. 6, *F*, the anteriors were banded with Johnson bands and a sectional wire was placed in the four anterior band brackets with hooks on the distal ends for intermaxillary traction. Retention is shown in Fig. 6, *G*.

Other cases may be treated by extractions in one arch only.

Much has been presented on the advisability of extractions because of desired improvement in facial esthetics.

Fig. 7, *A* shows a case which was referred to me after four premolars had been extracted for the correction of a bimaxillary prognathism. An excellent facial profile has resulted (Fig. 7, *B*). Slight spaces between the cuspids and premolars (Fig. 7, *C*) have developed in the two years after treatment.

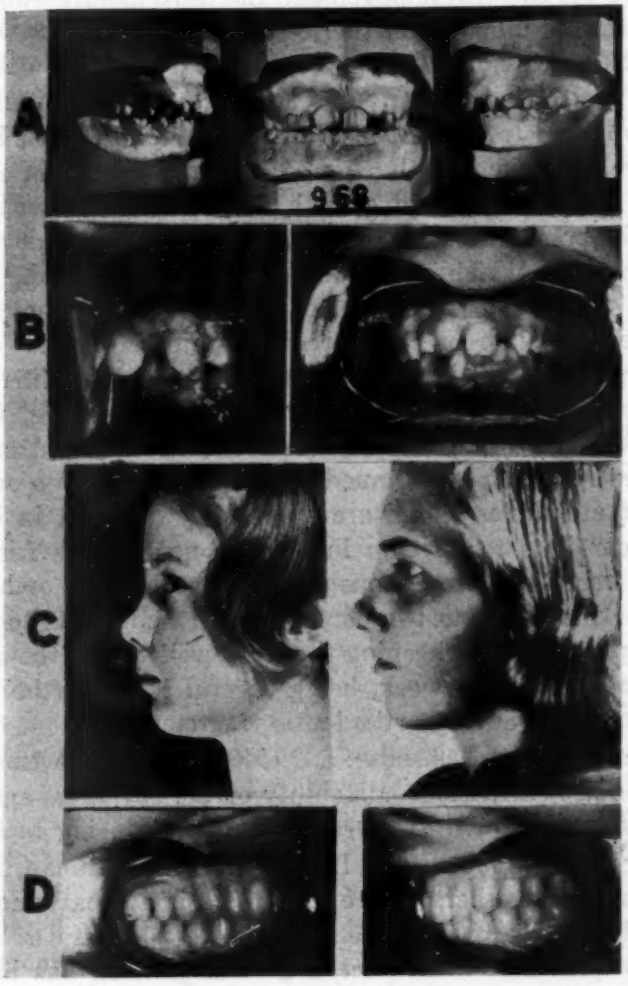

Fig. 8.

Fig. 8 shows a case which is quite similar to the case shown in Fig. 7, but in which no extraction was considered. A similar facial improvement will be noted (Fig. 8, *C*). The teeth photographs (Fig. 8, *D*) were taken seven years after retention was discontinued. It is interesting to note the improvement in the gingival tissues, which exhibited recessions in the malocclusion (Fig. 8, *B*) but a resultant healthy tissue (Fig. 8, *D*) after a normal functional relationship had been established.

In comparing these cases we are prone to wonder whether the case in Fig. 7 could have worked out well without extraction if treated at an earlier

age, and whether the case in Fig. 8 might have required extraction if it had been treated at a later age.

Growth is an influential factor in the determination of the justification for extractions.

Fig. 7 might have worked out well, both from an occlusal and a facial improvement standpoint, if the upper buccal segments had been moved distally. It is possible that, even though it were necessary to remove the upper second molars to get this distal movement, the third molars would have erupted to replace the second molars and the loss of four premolars would have been avoided. Which teeth can be lost with the least eventual disturbance?

These are problems which give us much room for thought and research.

I am not opposed to extractions, but still I feel we must be conservative, for I believe we know very little about the future results in extraction cases. We talk about the limitations of growth, but I sometimes wonder if we think enough about the possibilities of the extent of normal facial development in our growing child patients which is not caused by orthodontic aid.

At the last meeting of the New York Society of Orthodontists, Dr. Herbert Margolis showed many slides which recorded the actual forward mandibular growth in cases long after treatment was discontinued. This was a most interesting report and will be well worth a careful reading, for this growth problem has been a subject which has not been followed sufficiently after orthodontic treatment is discontinued. Dr. Margolis points out and we must not forget that mandibles which are apparently deficient in basal bone may and often do continue to develop in basal bone through functional growth which is quite remote to any influence of a mechanical orthodontic nature. He also believes that it is most important for orthodontists to take advantage of this growth possibility by keeping the teeth well within the alveolar support within the basal bony framework, being careful to avoid the development of any forward extrusion during orthodontic treatment.

Dr. Spencer Atkinson has shown a decided forward movement of the molar teeth during the growth period—a stability of the key ridge and palatal suture with a great forward growth of the teeth and jaws during facial development.

The excellent work of B. Holly Broadbent, Milo Hellman, Allan G. Brodie, Spencer Atkinson, and others, prove that there is a great amount of forward and downward growth of the face from 14 to 20 years of age. We must remember, however, that when once a growth pattern has been established, future growth will not alter that pattern.

Dr. Alfred Rogers believes that extensive growth takes place from the influence of myofunctional therapy—a regular systematic exercise of the masseter-temporal muscles. This exercise should be combined with a simultaneous forward pressure of the tongue against the anterior portion of the mandible below the lower incisors. At the same time, in this exercise, there is a definite lateral tongue pressure. A similar pressure is exerted in each act of swallowing.

So-called bimaxillary prognathisms will vary greatly in the extent of prognathism; also, the opinions of operators will vary to a great extent in

regard to what constitutes a prognathism which will warrant the extraction of teeth. Since it has been shown that a child at 12 years of age may be far from his maximum facial growth and that he may still gain considerable forward growth of the facial bones, I do not believe we can be sure at 12 years of age that all so-called bimaxillary prognathisms will warrant premolar extractions, nor do I believe we can be sure of an eventual stability in the correction of these cases by extraction.

In certain races, such as the Negro race, there is a normal bimaxillary prognathism which we would not endeavor to correct through extraction, and yet we attempt to correct that prognathism or bimaxillary protrusion in many other cases because we personally decide that they are abnormal. Our decision of abnormality in an individual may be wrong, for that seeming abnormality may be normal for that individual and should not be altered by orthodontic interference.

We can and have made great facial changes through orthodontics, but I am not sure that we can always arbitrarily change the facial forms which nature has developed and give to a child a facial profile which we would like him to have. The change which we have made may eventually return to the normal for that child's musculature. The *cause* of the facial form is paramount in determining the possibility of success if these cases are to be altered.

I cannot yet agree with such high percentages of necessary extractions, and yet I believe the time has definitely come, in our orthodontic progress, when we must admit that failures are frequent, and it is high time for someone to propose some drastic change in orthodontic technique such as Dr. Tweed has done. A year or two ago I had the privilege of visiting Dr. Tweed in his home and in his office. I heard him discuss and saw him demonstrate his methods of a differentiating analysis of cases as determined by the Frankfort-mandibular plane angle and his explanation that there were certain pronounced cases in which extraction was definitely contraindicated. This again proves to us that Dr. Tweed is only seeking the truth for the possibilities and also the limitations of benefits from orthodontic therapy. A splendid article on this subject by Dr. Tweed was published in the April, 1946, issue of the AMERICAN JOURNAL OF ORTHODONTICS AND ORAL SURGERY. Before Dr. Tweed had proposed this case analysis, extractions had been resorted to in many cases which later proved to be inadvisable. As time goes on and more clinical evidence is presented, we may find that some of the borderline cases, in which extraction is now advocated, are not developing prognostically as had been expected, and so it seems we should exercise caution lest through our enthusiasm we become too drastic in our desire for the attainment of perfection.

Because of this swing toward extraction I fear that many premolars are being extracted by those who are not familiar with the purposes involved in this philosophy, and orthodontics may eventually be severely criticized because of these unwarranted extractions. It is regrettable that all those who resort to extraction do not realize that extraction is advocated only as the last resort in the desire for successful treatment. It is not a cure-all and is definitely not an "easy way out."

Fig. 9 shows the case of a man, about 30 years of age, who had four premolars removed by his dentist. The profile is very good. The lower incisors were practically at a 90-degree angle to the mandibular base plane. There was a very slight crowding of the upper anterior teeth. Two weeks after the teeth were removed he was referred to me for treatment.

It is such cases that make us realize how serious the extraction theory can be when not followed by those who understand the problems involved and the indications which warrant extractions.

Some mistakes seem to be inexcusable and yet even the most conscientious and careful operator is not infallible. I have talked to some very able men who have followed the extraction technique and have wished they could replace some of the premolars which they have removed.

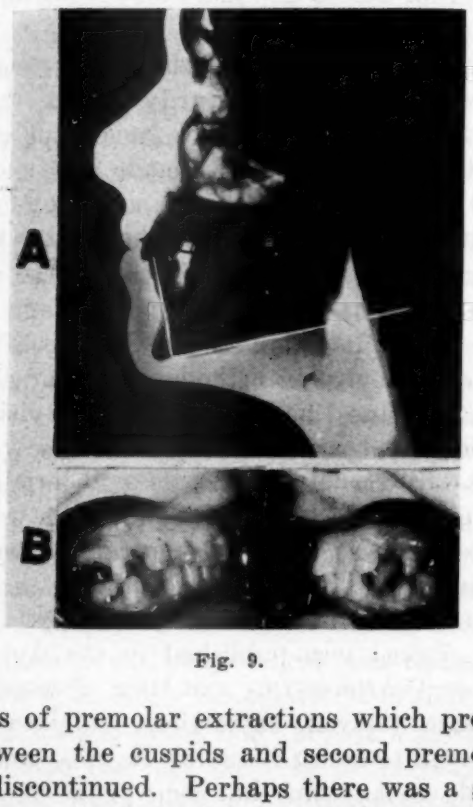

Fig. 9.

I have seen cases of premolar extractions which presented a space of 2 or 3 millimeters between the cuspids and second premolars a year or two after retention was discontinued. Perhaps there was a greater tongue pressure exerted than was suspected. I have wondered if the esthetics of the denture was improved. Will these large spaces eventually result in premolar and molar tipping and a consequent formation of deep pockets anterior to the tipped teeth, which so frequently occur when a tooth has been extracted and the adjacent teeth are not supported by bridgework?

A part of Dr. Strang's definition of normal occlusion states that there must be a "correct proximal contacting" and yet I have seen slight spaces left after premolar extraction which, unless repaired with inlays, would result in food impactions and possible eventual alveolar destruction, and I could not help but wonder about the future health of that mouth and whether the ex-

traction was justified or whether a slight anterior crowding would have been a lesser evil. If spaces are to be left between teeth, the large spaces are likely more desirable from a health standpoint than slight spaces which could result in food impactions.

On the other hand, I have seen cases in which four premolars have been extracted which presented a most beautiful result long after retention had been removed, and I am sure that that result could never have been obtained without extraction. The contacts have been tight and the face has been greatly improved esthetically—a definite proof that extraction was indicated in those cases. It is the borderline case in which I feel we should be cautious in our enthusiasm for extraction. The safest procedure is to try to stay in the middle of the road—open-minded and unbiased, but not too enthusiastic until we can feel definitely sure of our stand.

Some of our leaders state that the anterior teeth must not be moved forward, for the musculature will not leave them in that position. There is no question about the truth of that statement for we see it frequently in our case failures, but why, I wonder, do they believe the anterior teeth can be moved lingually and expect them to stay in these positions? It may place them in a better vertical position over the supporting medullary bone structure; but is it the bone which determines the eventual position of the teeth or is it the balancing of muscle forces of which the tongue is a most important unit?

If we extract four premolar teeth and bring the anterior teeth back, are we not reducing the normal tongue area, and is the tongue not liable to push these these teeth forward again and to some extent open up the spaces where the premolars have been extracted? Does the tongue become smaller in these cases to relieve that pressure, or are the lips to become stronger in order that the teeth may remain in these new positions regardless of tongue pressure? Are we perhaps going to find that we have been overenthusiastic in the extraction procedure when we were not sure of the actual muscle pressures exerted? How sure can we be of a positive prognosis? Reports of cases five and ten years after extraction will determine in which cases extraction has been justified.

I was much interested in an excellent case report given by Dr. Bercu Fischer and published in the July, 1946, issue of the AMERICAN JOURNAL OF ORTHODONTICS AND ORAL SURGERY. This reports the correction of a Class II case by extraction of four premolars. The resultant occlusion is excellent and the facial esthetics is greatly improved. The incisal mandibular angle was reduced 12 degrees.

The beauty of this case report was the fact that the entire treatment was recorded with casts, photographs, and radiograms which were oriented in their relation to the preauricular plane and also to the orbital plane. This orientation allowed a full case analysis after treatment. The charts showing the actual tooth movement indicate that while there was a posterior movement of the upper anterior teeth, there was in the mandible practically no posterior movement of the incisors, even though they were uprighted 12 degrees. There

was a posterior movement of the mandibular cuspids to allow a rotation of the lower anteriors, but practically all of the space created by the extraction of the lower first premolars was filled by a forward movement of the second premolars and molars and not by a posterior movement of the lower anterior teeth.

Thus the incisal edge of the lower anterior teeth did not change in the least in its relation to the tongue or to the orbital plane. The only questionable part of this analysis is the assumption that the orbital plane in growing children is a stable landmark for measurements.

Perhaps we have thought that extraction was resulting in a posterior movement of the lower anteriors in the attempt to correct the incisal mandibular angle, when, as a matter of fact, the tongue muscle may have exerted such a forward pressure that it has resulted in keeping these teeth in about the same position in which nature originally placed them and that the molars are moving forward. Atkinson believes the first molar roots should not be moved forward between the buccal and lingual plates, into the narrower area which was occupied by the premolars. We certainly do not know it all yet, but if we find that the molars are moving forward with no harm to the roots and buccal plates, I can then see the possibility of maintaining proximal contacts in spite of the tongue pressure, and the eventual result of extractions may be excellent.

If the position of the orbital plane is dependable, then case reports such as Dr. Fischer's are most valuable in actual analysis of tooth movements. I believe that some of the men who are following the Tweed philosophy are keeping such records that eventually we will definitely know just what is taking place in our case corrections. Until that time has come, we are simply speculating in our advice, and thus we cannot be sure enough of our ground to definitely know just what is and what is not a good orthodontic procedure.

At the next meeting of the Northeastern Society of Orthodontists, my friend, Dr. Ashley E. Howes, will present a method of case analysis through anatomical measurements. I believe we may be better able to know the limitations of orthodontic treatment through this method and we may even know in just which cases extractions will not only be advisable but will actually be *essential* if we are to gain and hold the results of our orthodontic efforts. Until we have more definite methods of determining the advisability of extractions, I believe that we are only guessing and that some of our efforts will not only fail in their intent but may result in an unintentional but irreparable harm to our patients.

Orthodontics in its struggle for progress is bound to go through many phases. We will not agree with them all. We will favor some, but we must not be swept off our feet by new methods until they have been proved over a period of years. On the other hand, we must not be so set in our beliefs that we will not remain open-minded and willing to listen to new ideas and, if they seem sound, to give them a fair trial in our practices. I have heard sound theories being ridiculed on the platform at orthodontic meetings. This is not a sign of open-mindedness in our struggle for definite orthodontic

progress. I am most willing to admit the great mistakes and lack of perfection in orthodontics and I believe there are certain cases in which four premolars should be extracted if we are to obtain the most ideal results, but until I have been able to see the results of some of these borderline cases for a much greater period of time than has elapsed since this theory became so popular, or until some more definite method has been developed for determining the advisability of extractions in borderline cases, I would be unwilling to follow this method of treatment to the extent that some of my friends are doing.

On the other hand, the fact that literally hundreds of consecutively treated cases with most beautiful results have been exhibited by the followers of the Tweed philosophy must make us realize that this theory cannot be disregarded by the profession. Not only have these cases been shown by Tweed and Strang but also by Copeland Shelden, Hays Nance, Otto Sorenson, Sam Lewis, Harold Kesling, Robert Rocke, and many others. These men have all leaned heavily toward the extraction theory, and if we are open-minded we cannot disregard these marvelous demonstrations—such as orthodontics has never seen before. If we are going to oppose extraction on a sound basis, then we also should have consecutively treated cases exhibited in which the results have been successful without resorting to extraction.

It is generally agreed that the position of the teeth is definitely determined by opposing muscle forces, and it makes me wonder about the possibility of stable results when we voluntarily change the incisor-mandibular angles of the lower anterior teeth in cases which vary from the average normal. In his article on "Factors of Influence in Producing a Stable Result in the Treatment of Malocclusion," Dr. Strang states as follows: "The muscles in action on the labial side are the cannini, triangularis, . . . etc. The tongue balances these forces on the lingual side."

Dr. Allan G. Brodie states that, in the examination of children with perfectly normal occlusions, some exhibited incisor mandibular angles of 90 degrees while others ranged from 83.5 to 92 degrees. For some definite reason these angles varied in these children, each having his own individual normal. I do not doubt that these angles were a direct result of equalization between lip and tongue muscle pressures.

We must remember that the *average* normal is not the *individual* normal, and that an individual normal which has been established by muscular pressures may appear to be an abnormality when judged by the *average normal* standard.

In extraction cases the incisal angle which nature has formed is definitely altered if it is beyond the average normal range of angulation. Can we be sure that nature is going to leave these teeth at a new angulation?

An excessive tongue pressure can readily cause cases such as that shown in Fig. 10 in which all upper and lower teeth have been separated because the tongue muscle pressure has been greater than lip pressure.

We can readily correct these cases by bringing the front teeth back, but this makes a smaller arch and the tongue is necessarily more confined. We have so corrected these cases and have seen the teeth, after retention is dis-

continued, gradually being pushed back into their original protrusions with the spaces all reappearing.

Fig. 11, *A* shows a case which illustrates this condition. The cast on the right has been separated to show that the lower as well as the upper teeth were separated from tongue pressure.

This case was corrected as shown in Fig. 11, *B*. The patient has now been wearing the removable high labial Hawley retainer for about five years. Each time the retainer is left off for a few days, the teeth again start separating. I believe it will be necessary to retain this case indefinitely because of the tongue-muscle pressure.

Fig. 10.

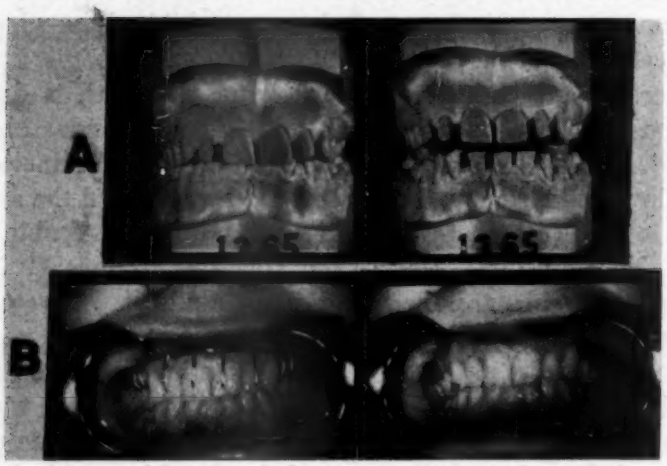

Fig. 11.

I believe the tongue muscle is a powerful force in determining the stability of orthodontic changes in both extraction and nonextraction cases. In the reading which I have done, I do not believe the uncontrollable tongue pressure has been emphasized to the degree to which lip and cheek pressures have been considered. In each act of swallowing there is a great forward pressure from the tongue, and I do not believe this pressure is sufficiently counterbalanced by lip pressure during swallowing to warrant a distal movement of anterior teeth in the majority of cases.

The shape of the dental arch is largely determined by the tongue pressure on the inside, as opposed to the lip and cheek muscle pressure from the outside. The more we change that arch shape which nature has created, the greater are the chances of failure in permanency of results. If we broaden and shorten a long narrow arch, the chances are great that nature will even-

tually upset our arch design and the arch will partially return to its original shape. If we shorten an arch without broadening it, the chances of retention are even more questionable, for the tongue area has then been definitely reduced in size, with no lateral compensation.

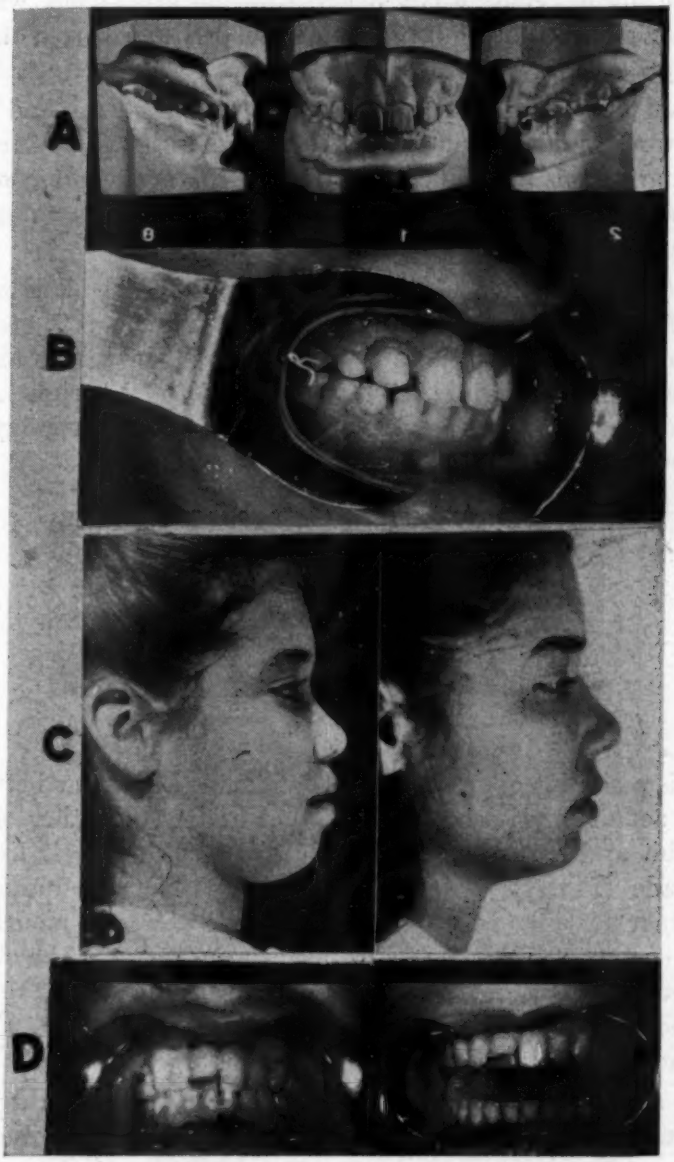

Fig. 12.

Tongue pressure without a counterbalancing of pressure from the lips and cheeks is an uncontrollable, powerful force.

Let me show you a few cases which illustrate the power of the tongue muscle and the influence it has on malocclusions and also on retention.

Fig. 12, *A* shows the casts of a bimaxillary prognathism due to tongue pressure. In Fig. 12, *B* the mandible was moved forward to show the spaces

between the lower teeth resulting from this tongue pressure. Fig. 12, *C* shows the facial change from before treatment to four years after retention. The prognathism has been reduced, but certainly it is far from pleasing from an esthetic standpoint. Fig. 12, *D* (left) was taken four years after retention and shows the spaces redeveloping between the anterior teeth, while the photograph on the right shows the large tongue, which has caused this tooth separation and a prognathic profile.

Extraction in such a case would have complicated the end result and, in my opinion, would not have improved the facial esthetics so far as the reduction of prognathism is concerned. Thus it seems most important to consider tongue pressures before resorting to extraction in our attempt to improve esthetically an individual's prognathic tendencies.

Fig. 13 (left) is an open-bite from a tongue habit. This may be due to a lack of sufficient room for the tongue, because there is a cross-bite on the right side and a consequent narrow upper arch. The upper arch was developed orthodontically, correcting the cross-bite (Fig. 13, right). This apparently resulted in more tongue room with a resultant tongue habit change. The open-bite closed without any treatment of the anterior teeth.

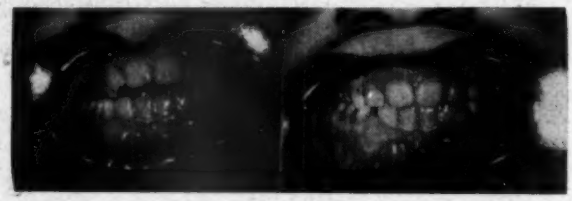

Fig. 13.

Fig. 14 is a similar open-bite, due to placing the tongue between the front teeth in the act of swallowing. The father and grandfather of this boy had the same habit and a consequent open-bite throughout their lives. An appliance was made (Fig. 14, *B*) with prongs on the upper lingual arch, which came in contact with the lower lingual "fence" when the mouth is closed and the teeth in occlusion. The appliance would thus prevent the child from placing the tongue between the teeth in the act of swallowing (Fig. 14, *C*). Note the automatic progressive closure of the bite (Fig. 14, *C*, *D*, *E*) without any treatment except the tongue-controlling appliance.

You are all familiar with such cases, but I sometimes wonder if the tongue pressure is sufficiently considered in our prognosis of those cases of extraction in which the tongue is liable to reopen the premolar spaces which we have closed.

In considering the possibility of extraction, we have three types of cases to deal with:

1. Those cases in which there is a greater amount of tooth substance than can be supported in the bone structure or in which there apparently has been a forward drift of both the upper and lower buccal teeth. These cases present great crowding of the anterior teeth. There may be a forward tipping of some of the lower anteriors because of the tooth crowding, but this tipping

is not because of tongue pressure. Such cases would seem to require extraction of four premolars, for the teeth could then be properly aligned, but the shape of the arches would not be greatly changed in relation to the tongue

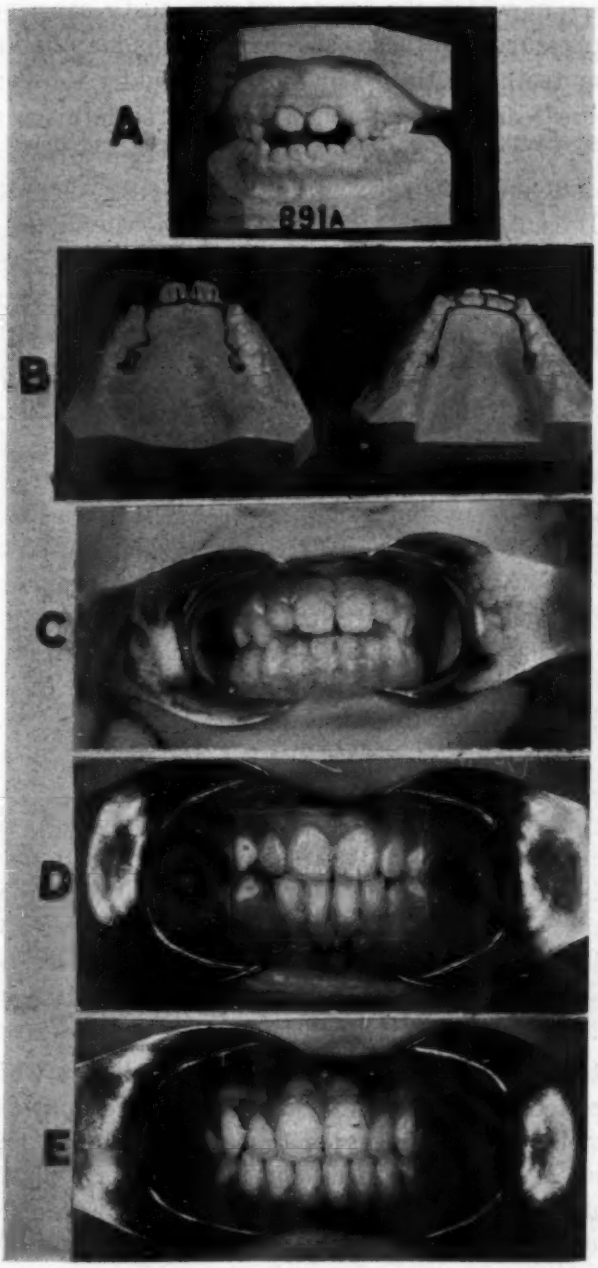

Fig. 14.

and lip and cheek muscles through which nature originally formed the arch design. The only other method of treating these cases is by lateral expansion of the arches, but we have all seen these cases gradually collapse over the years following retention. In my experience, expansion of arches is most dis-

couraging except when given through the growth period and in conformity with the normal lateral facial growth of that child. Extraction would therefore seem to be the logical method of treatment in these cases.

2. Those cases in which the lower anterior teeth are tipped forward because of tongue pressure. In these cases extractions may be very questionable, for if the anterior teeth are tipped or moved lingually to overcome the excess tipping or to correct an apparent bimaxillary prognathism, the arch is then made smaller and the anterior teeth are subjected to muscle pressures to which they have not been accustomed, and the eventual stability may be most disappointing. It is in these cases that I believe we should be very conservative, for I do not think we know now just what the future result of extraction will be. Case reports several years after treatment may convince us that we are wrong in believing that the eventual results in these cases will be harmful, but until we know more about it we should be conservative.

3. Those cases in which there has been an apparent mesial or forward drift of the upper buccal segments. In some of these cases it is advisable to extract an upper premolar on each side and leave the upper molars in a mesial relation to a normal occlusion. In other cases it is desirable to move the upper buccal segments distally. I find this to be good treatment in many cases, and I believe that we avoid the necessity of premolar extractions in many cases by that method. I realize that a distal movement of the buccal teeth is said to be impossible or at least extremely limited in the degree of movement. I do not claim to know what is happening in some of the cases which I would like to show to you, but my observation has served to make me believe that some of these cases were getting a distal movement of the buccal teeth. In my mental analysis of orthodontic cases I have attempted to picture the upper arch in three sections: the two lateral sections including four posterior teeth (the first and second molars and the premolars); and the anterior section including the six anterior teeth. In cases which exhibit an abnormal mesiodistal relation of the molars and premolars, I first attempt to establish only the correct mesiodistal relationship of these teeth. I find that after this is established the rotation, etc., of the anterior teeth is greatly simplified, and I consequently band very few anterior teeth when a case is started.

About eighteen years ago, I developed an appliance which, for lack of a better name, I called a "side-hook." This appliance is attached by bands to the upper first molar and to the upper first premolar only, and to the anterior of the appearance is attached a hook for intermaxillary elastics. The hook is lowered to about the occlusal surface of the premolar in order that the intermaxillary traction may be practically parallel to the line of occlusion.

In May, 1932, I was asked to read a paper at the American Society of Orthodontists, entitled, "Rational Methods of Orthodontic Therapy." I had been using the side-hook for about three or four years at that time, but when I suggested this type of appliance I did not feel that it was too well received, for a distal movement of molar teeth was not approved at that time. I have constantly used the side hook for seventeen or eighteen years, and I would

like to show you a few cases in which this technique has proved satisfactory to me. I believe that through this treatment I may have avoided in some cases the necessity of premolar extractions.

Fig. 15, *A* is a rather deep overbite with a bilateral distal occlusion treated with a lower lingual arch and upper side hooks (Fig. 15, *B*). Note the automatic raising of the bite through intermaxillary traction. Fig. 15, *C* is a photo of the teeth taken eight years after all retention was removed.

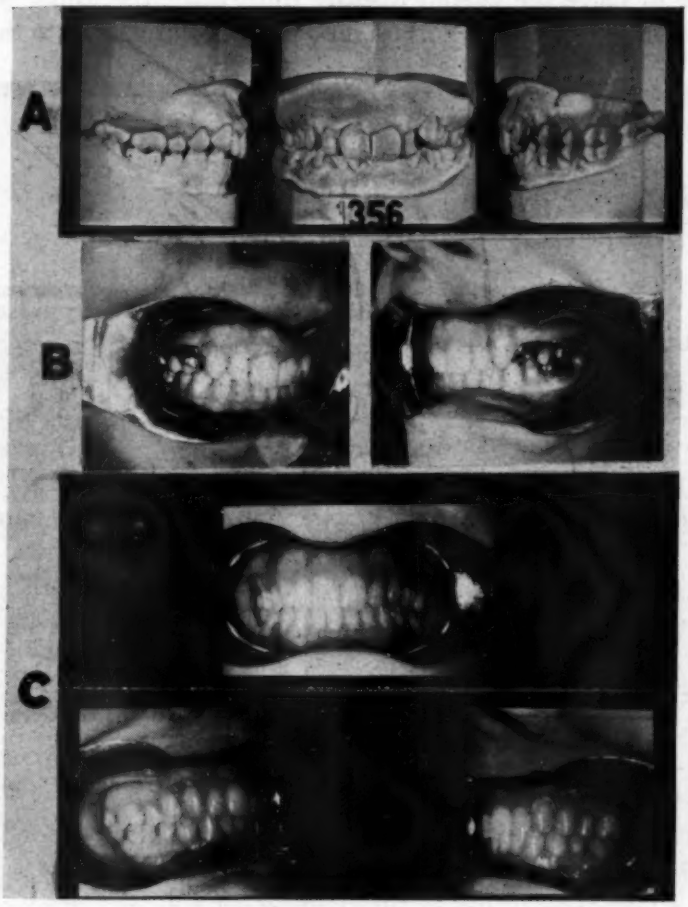

Fig. 15.

Fig. 16 is a similar case and treatment to that shown in Fig. 15. Note raising of bite during treatment (Fig. 16, *B*). The teeth photograph (Fig. 16, *C*) was taken three years after retention was removed.

In most distal occlusion cases I first use the side-hooks to correct the mesiodistal relation before any attempt is made to correct the positions of the anterior teeth.

Fig. 16, *D* shows the construction of the side-hook. We use a 0.040 by ¼ inch molar tube and a 0.028 by ⅛ inch premolar tube. The tubes should be fairly near parallel but not necessarily so, as the side-hook can be readily adjusted when placing in the mouth so it will be relatively passive.

When using a side-hook I occasionally find the premolar will not stand the entire force of elastics, and it then becomes necessary to band the cuspid tooth, also, to help give support for the pull of the intermaxillary elastics. In such cases a wire loop is soldered to the labial of the cuspid and an extension wire added to the anterior of the side-hook, which will readily slide through the cuspid loop as the side-hook moves distally through intermaxillary pull. The cuspid is thus simply helping to support the appliance. There is no attempt to move the cuspid distally until after the upper premolars and molars have been moved into a normal mesiodistal relationship to the lower teeth.

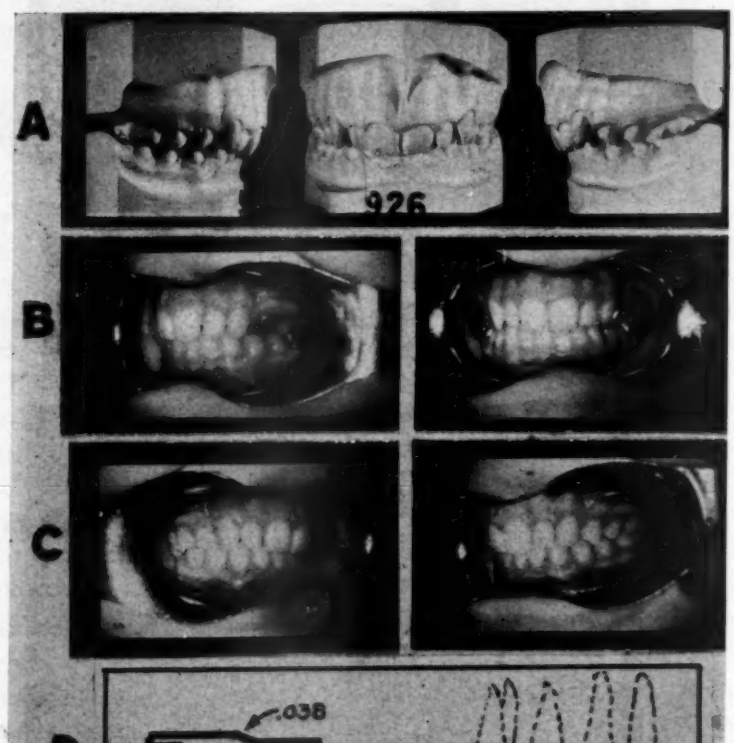

Fig. 16.

You will notice that by the use of side-hooks it is quite possible to establish a correct mesiodistal relationship of the premolars and molars so that there is a rather definite "locking" of the cusps in occlusion. I believe the establishment of this cusp relation has much to do with stability of results in Class II cases. The chance of stability is also greatly improved when the patient is placed on a masseter-temporal muscle exercise after the proper occlusion has been established. During the process of the use of side-hooks I have observed a very noticeable natural opening of the bite in excessive overbite cases. This fact alone has seemed of great importance to me, for the maintenance of corrected deep overbite cases has been most discouraging in

retention. In my experience, distal occlusion cases in which the overbite has been corrected through intermaxillary elastics have held fairly well, but Class I, or neutroclusion cases with deep overbites, have been very difficult to hold.

I found that many cases treated with the side-hook reacted favorably in a very short time. Others did not react so quickly. Apparently, the third molar development had a definite retarding effect on this type of movement. In such cases I believe it is good judgment to extract the upper third molar if it will aid in treatment and assist in permanently holding the results gained.

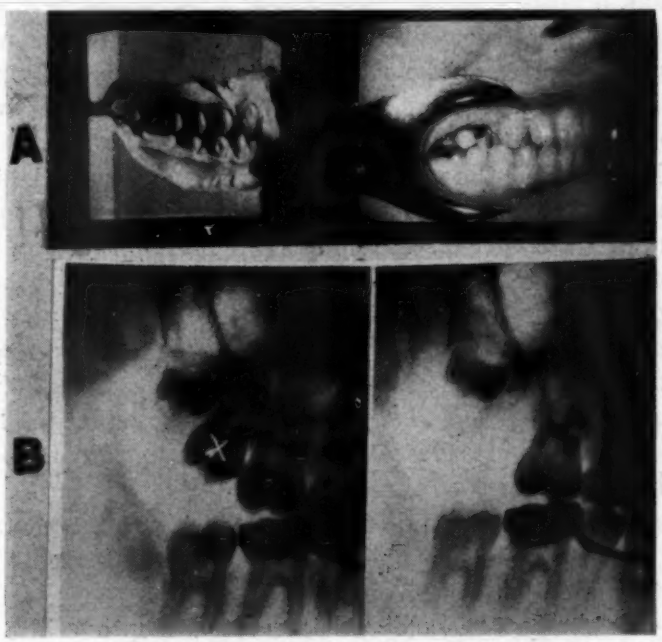

Fig. 17.

In some cases the radiogram showed the upper second molar roots tipped mesially with the third molar developing above. Such cases did not progress with the use of the side-hook. The more it was used, the more the second molar crown tipped distally (Fig. 17, *A*), and one could readily see that the second and third molar interference would probably eventually cause a forward movement of these buccal teeth and a consequent relapse in this phase of treatment. If the third molar looked as if it were a large, well-formed tooth that could replace the upper second molar, I felt justified in some cases in having the upper second molar removed (Fig. 17, *B*), allowing the third molar to erupt in contact with the first molar. In these cases the third molar would probably have become impacted eventually, anyway, with the probability of extraction in later life. The extraction of upper second or third molars is, in my opinion, less harmful in many cases than the sacrifice of four premolars. When premolars are extracted, it frequently becomes necessary at a later time to have the third molars removed also.

The use of side-hooks, I believe, aids to a great extent in preventing the development of bimaxillary protrusions through orthodontic treatment.

We have all seen Class II cases with maxillary protrusions which have been treated until there has been a definite forward tipping of the lower anterior teeth, with the resultant even greater facial deformity and a type of result which will not be permanent because of lip muscle pressure.

This is not the fault of the type of appliance used but rather, I believe, it is the result of our attempt to move too many teeth at one time. Any attempt of intermaxillary traction through the use of an upper labial arch, with or without bands, will probably result in a greater forward movement of the lower teeth than a posterior movement of the uppers. In that way, the upper protruding teeth are left forward while the lower teeth are moved forward to meet the uppers. It makes no difference what type of appliance is used except as this may be overcome by multibanded appliances which can give an added stabilization to the lower teeth.

When I had treated Class II cases by using an upper labial arch and a lingual appliance, I frequently found the lower anterior teeth tipping forward, but by first moving the buccal segments back I found much less forward movement of the lower anterior teeth and thus we maintained a rather perpendicular position of the lower anteriors. After the distal tipping of anchorage teeth was suggested, I also added this to case treatments, and this too has possibly aided in preventing too much forward movement of the lower teeth. The lower lingual appliance is always made to rest against the lingual surface of the lower anteriors very close to the gingival margin and never high on the inclined lingual surfaces of these teeth.

In the use of side-hooks and in most cases where intermaxillary elastics are used, we see a progressive opening of the bite. In some cases this can even develop to a definite open-bite condition.

I believe our chances of holding a corrected deep overbite are much better in distal occlusion cases than in neutroclusions or Class I cases.

Excessive overbites have been discussed considerably. Some have believed that it is due to an elongation of the anterior teeth and that the correction should be by use of appliances which band all anterior teeth and cause a depression of these teeth.

We do not know just what determines a deep overbite, for there is quite a variation in the range of normal and also of abnormal overbites (Fig. 18, *A*).

In these cases I believe the depth of the overbite is determined by an equalization between the muscle pressures exerted and the bone structure which is supporting the teeth in occlusion. Practically all of these cases will show a bulging of the lips (Fig. 18, *B*) which would indicate that there is a lack of growth of the posterior teeth and that the correction of these cases must be made by getting a further growth of the posterior teeth rather than a depression of the anterior teeth.

When the bite is raised, there is a decided improvement in the facial profile (Fig. 18, *C*) providing we are able permanently to hold the result gained. During the correction of these cases, we must necessarily get a growth of new bone as the posterior teeth are elevated, and to get this elevation of posterior teeth I believe it is necessary to resort to the use of a bite plane.

I would like to show you a few cases in which bite planes have been used. Fig. 19, *A* and *B*, shows an excessive overbite Class I case of a very cooperative boy who was attending a boarding school where he was unable to see an orthodontist. The constant wearing of a Hawley removable acrylic

Fig. 18.

bite plate (Fig. 19, *C*), together with a faithful masseter temporal myofunctional therapy, resulted in the correction shown in Fig. 19, *D*. Retention was followed for two years. One year after retention the bite had closed slightly, as shown in Fig. 19, *C*. They are not all retained as well as this.

Fig. 20 is a deep overbite Class I case in which two upper premolars were missing. An unsuccessful attempt had previously been made to treat this boy, but he was quite a "society" lad and refused to wear appliances which would show. His case was finally successfully treated by the use of a fixed lingual bite plane and a high labial arch (Fig. 20, *B*), which showed very little in talking and smiling (Fig. 20, *C*). Lingual auxiliary springs were attached to close spaces as well as could be done without resorting to bands.

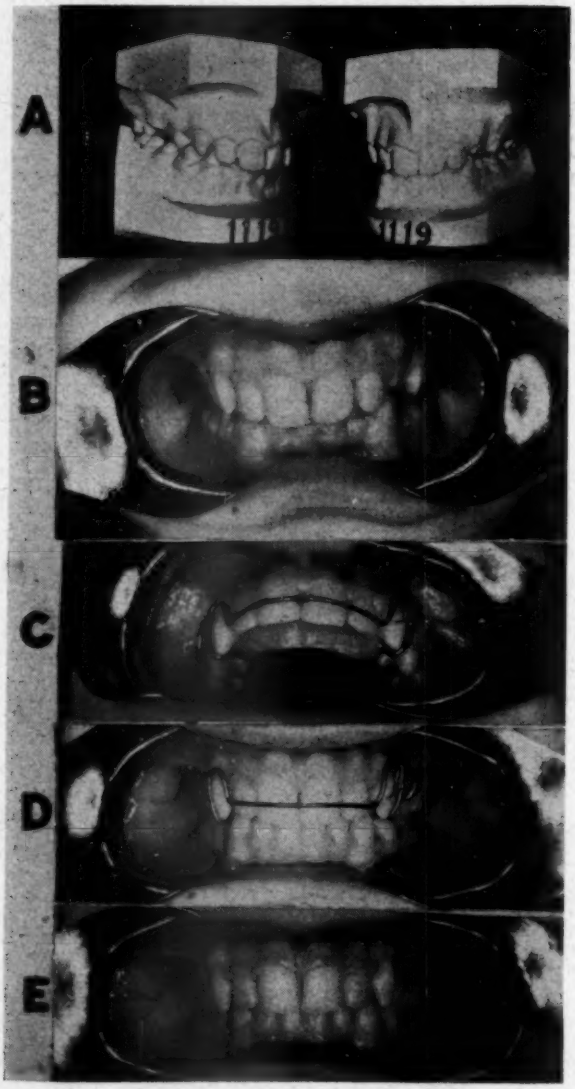

Fig. 19.

Fig. 20, *D* illustrates various types of bite planes which I use. Please note that flat wires (0.028 by 0.045) are soldered for each lower anterior tooth to touch when in occlusion. I prefer this to the crib type. The lingual arch is bent palatally to prevent bending from mastication, as shown in Fig. 20, *B* (right), and also in Fig. 20, *D* (D). This is quite important, for any contact of

hard substances on this portion of the lingual arch will result in a bending of the arch wire and a resultant dropping down of the bite plane from the anterior teeth when the mouth is opened. If this happens, the molar teeth will be loosened from the constant movement up and down of the bite plane in the acts of opening and closing the mouth when chewing.

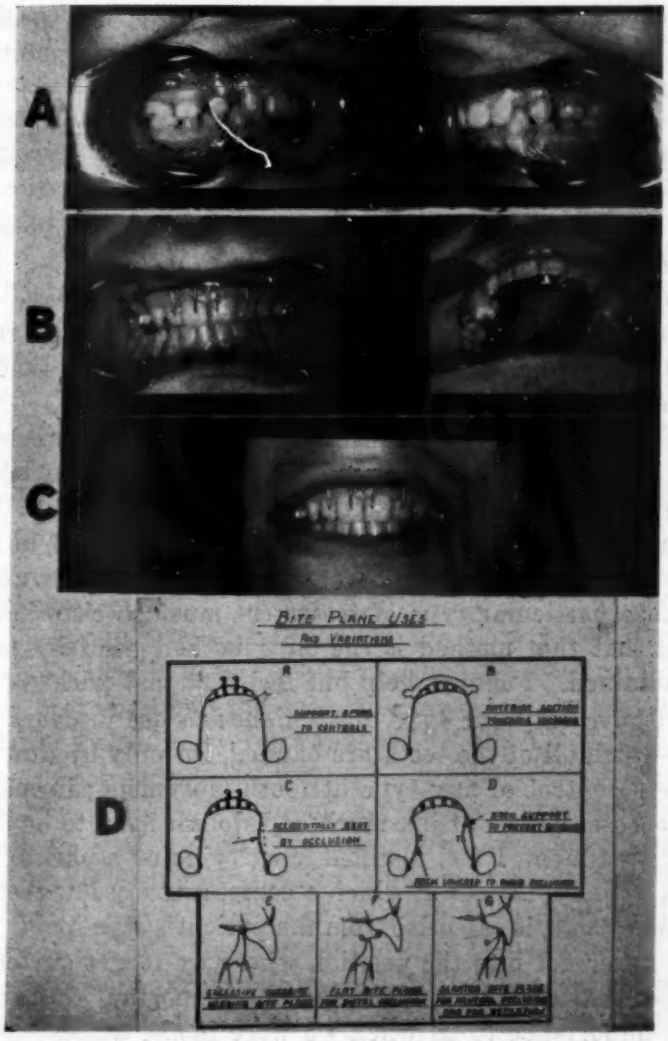

Fig. 20.

If, through the use of bite planes, we get an elevation of posterior teeth as is indicated by the change in facial profiles, we must then question the chances of stability, for in these cases we must necessarily get a new growth of alveolar bone. Our possibilities of stability after retention are entirely dependent upon whether this new bone structure will withstand the pressure exerted by the muscles of mastication or whether, because of these pressures, the teeth will again be depressed into their original positions. Many similar cases of deep overbites seem to react very differently during and after reten-

tion period, probably due to variations in muscle pressures and bone structures. Perhaps the variation in retention in these cases is because of a dietary condition rather than because of muscle pressure. One child with a good bone building diet may produce a good substantial bone structure during the process of bite raising, while another may be deficient in this respect, which would produce a bone structure which would not withstand the muscle pressure, and thus would end in a serious relapse. This is a problem which I believe would warrant more study in our desire for the solution of orthodontic problems.

You will notice that I used high labial appliances along with the bite planes, and this brings up the question of advisability of conservatism in appliance construction.

I marvel at the beautiful results obtained through edgewise technique and also through the Johnson technique. In many cases, however, fine results have been obtained through more simplified appliances. It is not *how* we gain our results that counts. It is *whether* we gain the results and, of more importance, whether the result will stand the test of time after all retention has been removed.

I fully believe that many cases can be treated *most* satisfactorily by banding all of the teeth, but I also believe that many cases can be treated with great satisfaction and quite ideal results without so many bands.

Some of us feel that to become proficient in the use of an appliance we must use one appliance only, and that any patient who is unwilling to be subjected to that particular type of treatment must go elsewhere. Often the patient is told that that method is the only method whereby satisfactory results can be obtained. I cannot help but feel that that perhaps is wrong.

If I could have only one type of appliance to use in every case, I would choose one in which all of the teeth are banded, for only by that method could I have complete control of any type of tooth movement; in many cases such an appliance is essential. But inasmuch as I do not have to be limited to only one method of treatment, I feel justified in carrying on a part of the treatment of many cases with appliances in which a comparatively few teeth are banded. And this, in some cases, is essential from the patient's standpoint.

We must never get into the position where we forget our childhood. We must not forget that the thing which seems unimportant to us now may have been of great importance to us when we were in the adolescent period. The esthetics of a future life may seem less important to an adolescent child than the esthetics of that particular period.

Many parents today do not have the control of a child's behavior to the extent that they may have had when you and I were children. Parents' problems are ever increasing in these days of greater child freedom. If a child definitely refuses to wear bands on all of his teeth during his high school period of parties, dates, and dances, and if the parents of that child are unable to convince him of the future benefits of such a course of treatment, are we justified in refusing treatment of any kind to that child? Should we, as punishment to him, let him always feel that the dental abnormality which

he presents must forever be with him as a great handicap because of his childhood stubbornness? Or should we give him the best treatment which can be given under those circumstances, even though it may be short of idealism? Would it not be better to have the feeling that we have at least greatly improved his condition and have done him a service for which he may be forever grateful even though it may not have reached perfection?

Please do not misunderstand me! I do not mean to let down the bars of idealism, for the lack of perfection in orthodontics has always been one of my greatest regrets. But here again we must exercise our judgment. The desire for idealism can, if we let it, warp our sense of how we may be of the greatest service to humanity. I have treated many children during the adolescent period of sensitivity when orthodontic apparatus was of great mental auguish. I have had many theatrical children in my practice and others who could not or would not have extensive banding of the anterior teeth. I have been proud of some of the results obtained with comparatively little banding of the anterior teeth. I know many of my results have been far from perfection, but they have frequently been of great satisfaction.

One of our prime purposes in orthodontics is to so improve a child that we may in that way help to develop his personality. The psychologists in their attempt to develop ideal personalities in children stress the point that the child should not be allowed to develop a feeling of self-consciousness which may possibly develop an inferiority complex.

We have many types of children to deal with. Some are more sensitive and self-conscious than others. Perhaps adolescent girls are more self-conscious than boys. Wearing of bands may not cause them to be "wallflowers" but they often believe that it does. We should first plan to use whatever type of appliance will best complete the case, but in my opinion, if that appliance is going to make the child very unhappy and so affect her that she develops a serious feeling of self-consciousness and a consequent desire to avoid all social contacts, then we perhaps are doing more harm in personality development than we would do good through an esthetic improvement. In such cases we may be justified in altering our plan of appliance construction to a more simple and inconspicuous type of appliance which will please the child and at the same time secure for us a better feeling of full cooperation during treatment.

In summary, let me again remind you that this presentation has not been in opposition to extraction; neither has it been in praise of extraction except as it may be practiced at the present time on a rather judicial and conservative basis. Until such time as we have seen more of the results of extractions in cases five, ten, or fifteen years after treatment, we will not be able to judge positively to what extent this method of treatment is justified.

I hope that through this presentation we may all have a definite feeling of conservatism and caution for our responsibility is great. Sane, sound judgment cannot go too far wrong. Let us all remain open-minded so that we can be ready to receive any change in therapy which in time will prove to have been of the greatest benefit in our desire for improvements in health, esthetics, and permanency of results.

When measured by decades since 1900 and even before that time, the phases of progress in the science and practice of orthodontics have been amazing, and they are still moving forward in steady strides.

We must ever broaden and strengthen our foundations in the fundamentals of biology, physiology, anatomy, heredity and environment to carry the increasing load upon which the successful analysis and treatment of every case is definitely dependent.

It is my opinion and prophecy that out of the present existing schools of thought, through experience, comparison, and observation, there will by elimination and combination emerge a coalescence of principles of diagnosis and treatment which will mark the next ten years as being one of the greatest in orthodontic history.

In this way orthodontics will become more firmly entrenched and can never be dislodged as an indispensable specialty of dentistry in our program of a great social and health service to mankind.

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Symposium—Pros and Cons

THE ADVISABILITY OF EXTRACTION AS A THERAPEUTIC AID IN ORTHODONTICS: AFFIRMATIVE*

ROBERT H. W. STRANG, M.D., D.D.S., BRIDGEPORT, CONN.

IN DISCUSSING the rationale of the extraction of teeth as a procedure associated with the treatment of malocclusion, it is advisable, as a preliminary statement, to enumerate what I consider to be the essential objectives of orthodontic treatment. I would tabulate these as follows:

1. A denture that is functionally efficient which means that the so-called inclined planes of the teeth should mesh correctly and that the axial inclinations of the various dental units should be properly adjusted to the lines of masticatory stress.

2. A denture in which the component dental units remain stabilized without mechanical support, subsequent to corrective tooth movements.

3. A denture in which the teeth and the tissues of tooth support exhibit no evidence of structural damage as a result of treatment.

4. A denture that predisposes longivity of service with unimpaired resistance to any traumatic or inflammatory degenerative processes to which it may subsequently be subjected.

5. A denture so located in relation to facial and cranial structures as to give artistic balance and harmony to the facial lines.

There is no question but that the basic and scientific ideal of the specialty of Orthodontia, which, of course, is the structural composite known as Normal Occlusion of the Teeth, exhibits all five of these desirable qualifications. This being acknowledged as a specific objective which would assure successful terminal results in treatment, why should there be any reason for such a radical compromise as tooth extraction, which so drastically violates this ideal?

For years the orthodontic profession has been treating cases of malocclusion under the firmly established delusion that if the dental arches are enlarged sufficiently to accommodate all of the teeth in perfect alignment, with proper cuspal adjustment and correct axial inclinations, subsequent functional stimulation would effect renewed growth in the inharmonious and inadequate bony bases so that, eventually, ideal normal occlusion would be attained and sufficient osseous support would be evolved to assure permanent stabilization. The writer practiced and taught this method of procedure for thirty years. Strange as it may seem, the success attained in a small percentage of cases has been sufficient to keep this theoretical ideal constantly in the foreground.

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However, this idealistic dream was shattered a few years ago when conclusive evidence was presented by research workers, foremost among whom were Broadbent, Brodie, Schour and Hellman, that the growth centers in the mandible and maxillae were characterized by a time gradient, a gradient of intensity, an age gradient, and a locus gradient. In other words, there is a specific period for certain fixed areas within the mandible and maxillae to take on growth activities and this growth will be intense for a certain length of time and then gradually slow down until it ceases activity altogether. Thereafter, each particular growth center will continue to remain quiescent and cannot be stimulated into renewed activity by functional stress. The age limit for eighty to eighty-five per cent of the activity of these growth centers, with two exceptions, was reported to approximate five to seven years. The exceptions are the growth centers at the necks of the condyles of the mandible which maintain activity until about eighteen years of age.

This means that if the bodies of the maxillae and mandible have not obtained sufficient forward and lateral growths by seven years of age to accommodate the twenty-eighth teeth comprising the denture at the twelve-year period, no amount of functional or mechanical stimulation can reactivate sufficient growth to harmonize these osseous bases with the tooth patterns designed for them.

Furthermore, it was demonstrated that the only osseous tissue that is modified by the mechanical movement of teeth is the alveolar process. The underlying basal or medullary bone is unaffected.

These facts, presented by several research men, all in agreement and already substantiated by clinical data of years' standing, offer convincing reasons why the ideal structural composite, Normal Occlusion, is not within the bounds of attainment in a large percentage of cases, as the end result in the treatment of malocclusion.

It was Charles H. Tweed of Tucson, Arizona, who courageously revived the practice of reducing the number of dental units in order that the remaining teeth might be rearranged to positions wherein they were properly supported by these undergrown bony bases. He was influenced in this radical procedure by observing that the mandibular incisors in all naturally grown normal occlusions, were located in positions overlying the body of the mandible in the mental area of the jaw and exhibited an angle of inclination of approximately 90 degrees with the lower border of the mandible. By extracting a bicuspid tooth on each side and utilizing these spaces to move the six anterior teeth lingually and distally to locations wherein they were overlying their undergrown bony bases of support and were at approximately right angles to the lower border of the mandible, he secured unsurpassed stability as a result of treatment. He demonstrated his successes by presenting two hundred consecutively treated cases that were superb in approaching the five desirable results of treatment tabulated at the beginning of this presentation. Such overwhelming evidence of successful orthodontic care had never been offered before

In a certain percentage of cases, Dr. Tweed and many of us who began following his principles of treatment, attempted to avoid extractions, in getting the mandibular incisors back onto their basal supporting bone, by an excessive

widening or expansion of the denture in the canine, premolar and molar areas and by tipping these buccal teeth distally. Many of these cases showed tendencies to relapse. This relapse consisted primarily of a lingual movement of the buccal teeth in an effort to restore the original denture width and a coincidental forward movement of these teeth to their former anteroposterior positions. In so doing, the incisor area of the denture was again impinged upon and the incisor teeth subsequently were thrown out of alignment. Many of these cases were also complicated by third molar impactions.

This led to the deduction that not only must the incisor teeth be placed and maintained in positions overlying their bony bases, but the buccal teeth must also be kept in locations wherein they were properly supported by basal bone. Among the first in the East to oppose the excessive expansion of the dentures in the buccal areas for the purpose of adjusting the incisors to locations overlying their basal bone and so avoiding extractions, was Dr. Harry Bull of Jersey City, N. J. Through frequent discussions of this factor with Dr. Bull, your essayist was led to make a careful analysis of this question of buccal expansion. From this study he drew the conclusion that the relapse of these excessively expanded dentures was also due to another more active and fundamental factor than lack of basal support. He concluded that this active factor was upset muscular balance.

In support of this deduction, it must be borne in mind that every case of malocclusion represents a denture in which the teeth are stabilized in their faulty locations by muscular forces that are in perfect balance. Usually these environmental muscles are not normal, either in action or tone. No method of treatment has been successful in overcoming muscular abnormalities. Therefore, it naturally follows that if we are to have a stabilized denture as the end product of treatment, we must preserve the muscular balance that is present in the original malocclusion, in addition to placing and keeping the teeth in locations overlying their bony foundational support. This can only be done by avoiding any expansion of the mandibular denture, particularly in the canine and molar areas, where muscular pressures are felt to a maximum degree. Furthermore any forward movement of the incisor teeth is contraindicated because it also upsets the muscular balance in this area and these incisor teeth are bound to be forced back by muscular pressure when mechanical support is taken away.

All forms of treatment based upon gaining sufficient denture area to accommodate the full complement of teeth must necessarily obtain the desired space by enlarging the dental arches, either by moving the anterior teeth forward, the buccal teeth laterally or distally, or, as is the usual procedure, by a combination of these movements. By so doing the greatest factors in maintaining tooth stability, i.e., basal support and muscular balance, are destroyed and hence, no matter how many years mechanical retention is maintained, there is bound to be a relapse and a restoration of tooth malpositioning when the retaining devices are removed. Failures of this character are classic in the history of orthodontia.

In addition to such failures in stabilization, enlargement of the denture often is attended with destruction of alveolar process on the labial and buccal side of the teeth in the gingival section of their roots. The tolerance of tissue resistance has been overstepped by these excessive expansion movements.

Having experienced all of these various complications and disappointments in thirty years of clinical effort to correct malocclusion without resorting to the extraction of any teeth, your essayist decided it was time to change his methods of procedure. For the past eight years he has treated malocclusions by resorting to the removal of dental units and utilizing the denture areas thus acquired for placing and keeping the remaining teeth in positions where they would have essential basal support. He has also been careful to preserve the inherent muscular balance present in every malocclusion by avoiding all labial and buccal movement of the mandibular canine and molar teeth. The maxillary teeth are carefully adjusted to this stabilized mandibular denture. As a result of such form of treatment he has found that a majority of cases do not require any mechanical retention subsequent to the removal of the tooth-moving appliances.

The relapsing of the mandibular incisors to malpositions quite identical with those preceding treatment, a catastrophe that almost invariably followed the removal of retaining appliances in dentures treated by universal expansion and without extractions, no longer occurs. Furthermore, there is no evidence of loss of alveolar bone and the gingival tissues are healthy and adherent to the cervical margin of the teeth. Balance and harmony in facial lines is vastly improved and the repellant, "toothy" appearance so frequently noted at the completion of orthodontic treatment, is entirely eliminated.

Having conscientiously tested both methods of treatment, there is no doubt in my mind that the judicial extraction of teeth is a rational, essential and justifiable procedure to incorporate in the correction routine of a majority of cases of malocclusion. Furthermore this clinical evidence has the scientific support of research authorities who confirm the limitations of jaw growth and the impotence of mechanical stimulation upon this biologic phenomenon.

In conclusion let me emphasize an indisputable fact that if a normal organ is to be evolved as an end product of treatment, the operator must have normal building material to work with or some positive means of obtaining or producing perfect parts for constructive procedures. In malocclusion, many of the component parts of the dentures are imperfect in form and faulty in action. These structural defects cannot be restored to adequate size, form or function. Hence a compromise is a logical and necessary course of action. Consequently if the osseous foundation of the denture cannot be made of sufficient size to support the full complement of teeth and the muscular balance cannot be preserved if the dental arches are enlarged, then the quantity of tooth material must be reduced to a harmonious relationship with these two unalterable factors if permanent stability is to be assured and tissue integrity is to be preserved.

THE ADVISABILITY OF EXTRACTION AS A THERAPEUTIC AID IN ORTHODONTICS: AFFIRMATIVE*

ARTHUR V. GREENSTEIN, D.D.S., NEW YORK, N. Y.

A THERAPEUTIC measure is one which is designed to cure or alleviate a condition, and according to the Encyclopedia Britannica, is either symptomatic or radical. If it is symptomatic, it obviously relieves the distress accompanying an illness until Nature in her own way accomplishes a cure, and if it is radical, it eliminates, entirely or in part, the cause of the condition. It is in this sense, rather than in the sense of being extreme, that the word "radical" is applied to the removal of teeth as a preliminary measure in the mechanotherapy associated with orthodontic treatment.

Extraction for the correction of irregular teeth was practiced in antiquity, but it was not until the adoption of the Magill band cemented to the tooth, at the beginning of this century, that our pioneers were enabled to devise technical measures for precise tooth movements. Case, Goddard, and Guilford were among the proponents of extractions, not routinely, but in some cases. Angle, the Father of Modern Orthodontia, first espoused extraction but toward the end of his career was its most emphatic opponent.

Although he was a great genius, he was not fully aware of all the implications contained in his statement regarding normal occlusion. Had he lived a few more years, he no doubt would have realized that this ideal is only possible of attainment in those individuals who have experienced normal growth and development in general.

Let us consider Angle's dictum that "The best balance, the best harmony, the best proportions of the mouth in its relation to the other features require that there shall be the full complement of teeth, and that each tooth shall be made to occupy its normal position—normal occlusion." At the time of the controversy between Case and Angle this statement was interpreted in the light of the then existing knowledge. Now, however, we know that the facial skeleton does not always attain optimum proportions, while the teeth, formed in utero and early infancy, are almost always fully developed.

Angle's interpreters are in error when, through faulty reasoning, they assume that if the teeth of an individual are brought into correct cusp relationship, no other factors need be considered. This error as a fundamental concept is largely responsible for the prolonged treatments to which patients in the past, and alas, too often at present are subjected.

The mere mechanical arrangement of the teeth, even by the most expert, can in no way influence the etiological factors which played a major role in the production of malocclusion. No proof has ever been offered that in man the

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functioning of a dentition which has been placed in, so-called, "normal occlusion," or rather articulation, will stimulate previously inhibited growth centers to renewed activity. On the contrary, Broadbent, Brodie, Margolis, and a host of others in the course of their various precise scientific observations, have proved beyond a doubt that change in form of the alveolar processes brought about by orthodontic treatment can in no way influence the underlying subalveolar bone.

Charles H. Tweed was the first to point out that one of the fundamental criteria of normal occlusion was the upright position of the mandibular incisors in relation to the mandibular border, a position of mechanical functional balance. Obviously, the degree of uprightness varies with the physical type of the individual in question. Furthermore, Tweed showed that it was not possible to place these incisors correctly in treating many malocclusions, unless space was gained by the elimination of tooth units for the rearrangement of the remaining teeth. As has been said, extraction is not new, but Tweed was the first contemporary orthodontist to advocate its use in conjunction with a precision technique. While any method can be used by a skillful operator, the appliance of choice in the experience of many orthodontists, who in selected cases resort to extraction, is the Angle Edgewise Arch mechanism used in accordance with the Tweed Technique.

Normality presupposes the attainment of the fullest potentiality of growth and development by an individual, in accordance with his hereditary pattern. I commented in a previous publication on Strang's definition, which is an amplification of Angle's Dictum, "That normal occlusion implies a normal growth, development, location, and co-relation of all environmental tissues and parts."

Lundström's work on the apical base was first published 1926. It made very few ripples on the calm pool of the orthodontic thought of the time. He pointed out that in a large series of cases where the teeth had been carried beyond the apical base, relapse inevitably followed. It is only in the past few years that the profession has rediscovered his work and is becoming increasingly aware of the fact that each individual possesses a definite limited amount of tooth supporting bone, that if the teeth in treatment are moved so far that the alveolar process is unsupported in the direction of stress by an adequate "alveolar base" subsequent collapse is bound to occur.

The incidence of severe dental irregularities or anomalies among primitive peoples is rare. Malocclusion is one of the artifacts left on the human body by the impact of civilization during the process of growth and development. Many overlook the fact that the orthodontic patient who presents himself with malocclusion is not normal. Malocclusions except those due to local causes within the denture itself are due to general causes with clinical or subclinical manifestations. The patient is or has been sick. He may or may not have recovered from his illness; the stigmata remain, and one of them is a lack of basal, "subalveolar bone." Correction of the resultant diverted or perverted position of the teeth must, therefore, of necessity be a compromise. A compromise which, if it is to be successful, often requires a reduction in the number of dental units, so as to reconcile the amount of tooth structure with the size of the investing and supporting tissues. By removing certain teeth and moving the other teeth to new

positions without widening the dental arches we are redirecting the forces which have aided in the production of the malocclusion so that they work for, rather than against us.

If we are to retain all the teeth and at the same time attempt to correct the malocclusion, it will be necessary to do one of three things, or possibly, a combination of all of them. In the first place, the anterior teeth might not only be moved too far forward to be in a position of mechanical advantage, and if this is done the facial appearance of the patient will adversely reflect the new tooth positions. Secondly, molars and premolars can be overexpanded, but with this form of treatment, the subsequent complete or partial relapse is merely a matter of time. Thirdly, if all the teeth are moved backward to a position beyond their normal anatomical relationship to the underlying bone, the third molars, particularly in the mandibular arch will be impacted. All orthodontists are aware that wherever the anterior teeth are found to be crowded before treatment and no dental units are removed, the treated case must be retained indefinitely, to prevent the teeth from relapsing to their original position.

The teeth that are usually removed are the four first premolars. In Class I cases or those in which the molar relation has already been corrected, treatment consists of carrying the six anterior teeth in both arches back until they are upright and on the ridge, and the canines and the second premolars are contiguous. If the molar relation requires correction, it is usually done in the accustomed way after the spaces have been closed. This entire procedure demands precise thorough treatment. It is not an easier way out for the orthodontist, and should not be lightly undertaken by partly trained men, and in no way is offered as a panacea. Unless this procedure is handled by properly trained men it can well make a bad matter worse. But in the hands of a conscientious operator, it will provide stable end-results, accompanied by most satisfactory esthetics.

As a dentist, I share the reluctance to order the removal of four first premolars. However, when I realize that the alternative is to face a relapsed case, with doubtful esthetics, and the removal of four impacted third molars, as a result of treatment, then the choice is not difficult to make.

As has been stated, orthodontic treatment is at best a compromise and if, where indicated, extraction is resorted to as a therapeutic measure, more of the factors or normal occlusion can be realized than if all the teeth were to be maintained. It can therefore readily be seen by the open-minded, that this radical treatment, in the last analysis, is by far, the most conservative.

Those of us who are guided by Tweed's principles are of the opinion that as long as improved esthetics are a recognized goal in orthodontic treatment, any therapeutic measure which increases stability of the finished result and at the same time gives the greatest esthetic improvement more than warrants the serious consideration of the dental profession.

THE ADVISABILITY OF EXTRACTION AS A THERAPEUTIC AID IN ORTHODONTICS: NEGATIVE*

JOHN W. ROSS, D.D.S., PHILADELPHIA, PA.

THE subject of this presentation is a matter which involves the welfare of the patient and the reputation of the general practitioner and orthodontist. The extraction of sound, vital teeth as an aid in orthodontic treatment is not a new practice. The advisability of this procedure has been discussed for many years. The extraction of teeth and the discussion of when and where to extract is older than orthodontics. Ever since man has tried to change the positions of teeth, this subject has filled many pages in the literature.

Modern orthodontics, fathered by Dr. Angle, was primarily opposed to this practice. Extraction of sound teeth for the purpose of aiding orthodontic corrections is advocated from time to time but as succeeding groups of orthodontists realize the errors of this procedure and evaluate the evidence of mutilated dentitions, it passes out of current thought and literateure only to be revived at a later period.

During the last few years considerable effort has been made to promote extraction as an aid in the correction of malocclusion. Differences of opinion always create discussion and programs such as this are included in many orthodontic programs. This reflects an earnest desire to learn the truth.

I do not extract teeth; I do not believe in the extraction of teeth as an aid in the correction of malocclusion. I believe that extraction makes treatment more difficult and the result less satisfactory from the viewpoint of both health and esthetics.

The purpose of dentistry is the maintenance of the oral cavity in a state of health. All of us know the effect on the dental organism of the loss of a tooth. The alveolar process and dental periosteum suffer and the denture is unbalanced.

There is a number of teeth and an arrangement of teeth common to man. The form of the dental arches is the result of a long evolutionary process. While the arrangement of teeth in man follows a general pattern, there is variation in the size and length of arches, in angle of inclination of the individual teeth in relation to the mandible and maxilla, in size and form of individual teeth, and in occlusion of the teeth on opposite sides of the mouth. Axial inclination not only varies in different individuals but in the same individual at different ages.

The arrangement of the teeth in the occlusal pattern common to man has a direct relationship to the lower half of the face. The contours of the face are often the result of the size and arrangement of the teeth. The result is usually pleasing and well proportioned.

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The goal of dentistry, orthodontics and prosthetics has been to preserve or restore the condition which form and function make best suited to the individual. Occlusal balance and facial form must be integrated into a harmonious unit.

Not all children need orthodontics. Most children reach maturity in a normal manner and with a normal balance of teeth and face. Do not forget that in this discussion we are speaking of children whose development is outside of normal variation and not of the great majority of children who develop without orthodontic measures. The goal of treatment, in the opinion of most practitioners is a harmonious relationship of teeth and face. Unfortunately, some men ignore the face, as a whole, and think only of the mouth and the arrangement of the teeth. They are the ones who see no harm in extraction.

Those who believe in extraction routinely tell us:

That our previous standards of occlusal relationships are wrong;

That the facial pattern, as normally existing, is wrong;

That the relationship of teeth to face as established by Nature through countless generations of evolution is wrong;

That the normal positioning of teeth on underlying structures is wrong;

That we must discard all previous plans and patterns, extract teeth and change the axial inclination of teeth, thus collapsing the face.

To this I am opposed.

What is beauty? What are our standards of the beautiful face? To certain African tribes, a distended upper lip is a mark of beauty. To the older generation of Chinese, the bound foot was beautiful. To certain modern artists, surrealist paintings express beauty. To those who advocate extraction, the sunken face with lines from nose to corner of lips, as seen in the edentulous, must seem beautiful. My dislike of the unbalanced face is probably my chief objection to extraction.

The aim of orthodontics is the development of a mouth so that the teeth and their supporting structures may function with the maximum efficiency and so that pleasing facial contours may be achieved.

Malocclusion usually occurs in children in whom the growth processes have not functioned to their maximum capacity. We try to develop in these below par children as nearly a correct functional positioning of teeth and relationship of teeth to face as it is possible to procure. To develop a part of the body, the oral cavity, by means of applied stimulation, an orthodontic appliance, calls for careful attention to the fundamentals involved in the development of the dentition.

The lower part of the face containing the mouth and teeth is the last part of the human organism to be finished in its growth and development. This part is frequently not completed until around the twentieth to twenty-second year of life, or even later. Many of the errors of orthodontic practice are the result of trying to correct malocclusion and establish the new relationship prior to the period in the development of the individual in which such a correction can be harmonized and maintained. It is impossible, through orthodontic interference, to place the mouth of a sixteen- or eighteen-year-old in a child of ten or twelve and expect it to be maintained. The resulting disharmony may be greater than

that which was originally present. Collapses resulting from the disregarding of these facts, have led men into the pitfalls of extraction.

Many men, as my opponents in this discussion will tell you, extract the four first premolars before the eruption of these teeth and long before they can know to what extent growth will develop the organism. Not being a prophet nor possessed of super prophetic intelligence, I cannot tell, at an early age, such as ten or twelve years, what the development of the jaws will be at maturity. The results at maturity of early extraction usually cause the operator chagrin and regrets and the unfortunate patient is condemned to a flat face throughout life.

My opponents who advocate extraction will tell of the permanency and stability of cases in which extraction has been used. The word "permanent" has been a curse in dentistry; there is no such thing as permanency in dentistry. It is a misnomer. All of us have seen the failure of permanent fillings, permanent bridges and permanent dentures. So it is with permanent occlusal relationships. The mouth is an ever-changing organ. Occlusal relationships change in the different ages of man. We often see occlusions which were good in the twenties and thirties become unbalanced in the forties and fifties. The mouth of a patient at maturity presents a totally different picture from that which was present at ten or twelve years, whether or not extraction was used. No orthodontic case can be stabilized until the post-adolescent developmental period when facial harmony is established.

I am opposed to extraction because I believe in the integrity of the individual tooth. The preservation of the tooth and its investing structures is the basis of dentistry. Teeth and their investing tissues must be preserved in order to maintain the teeth and tissues in harmonious functional relationships. It is impossible to extract a tooth, let alone four teeth as my opponents advocate, without destroying the dental periosteum and attachments. The loss of bone surrounding the tooth influences not only the adjacent teeth but the entire dental mechanism as well.

Let us consider the relationship of teeth to supporting structures. Unfortunately, most of us assume that the structures which are not visible are perfect. This is not true. The tooth is held in its socket by the peridental fibers. These fibers not only hold one tooth but are interdigitated with those holding the next tooth. This continuous relationship of peridental fibers gives us a continuous stability of the dental arches. The preservation of this relationship is our responsibility and obligation.

When a tooth is extracted its peridental fibers are destroyed. The bone supporting the tooth, the dental alveolus, is absorbed. The dental periosteum of the teeth adjacent to the site of extraction are impaired and the stability of the denture is permanently lessened. Reliable histologists tell us that even though the space be closed, a complete restoration of the dental periosteum does not occur. Dentistry has been built on the maintenance and preservation of the individual tooth? Shall we toss this ideal into the ash can?

The extraction of premolars with the loss of bone which accompanies this operation does not necessarily mean that the canine and anteriors will be maintained in a posterior collapsed position. In many cases, the posteriors drift and are brought forward because of the normal forward growth of the parts. In

many cases in which extraction has been employed with the hope of correction, we find that after retention is removed and post-adolescent growth and adaptation take place, the teeth are spaced. This causes food pockets and at a later period periodontal involvement results. From the standpoint of the maintenance of oral health, this procedure leaves much to be desired. All agree that orthodontic interference in a child can do harm and frequently does. We know that the minimum amount of tooth change and readjustment which will achieve the desired result is the most desirable method of correction. The work of Oppenheim and others show conclusively the harm to the dental periosteum and dental alveolus and to the roots of the teeth which results from complicated orthodontic procedures. Infinitely less tooth movement and adjustment are required in handling cases which have not been complicated by extraction.

The economic factor is also a consideration in extraction. In recent years a get-rich-quick attitude seems to have developed in some parts of the dental profession. Many teeth which could have been filled have been extracted to make room for a bridge. Many teeth which could have been saved by root canal therapy have been sacrificed because of the economic consideration. I must confess that this has entered into the consideration of many orthodontic cases. Many men extract not because they believe in the method but because they believe, erroneously, that they can complete the case in a shorter time, that the case will be maintained more easily, and that, as a result, they will get their fee more quickly and more easily.

Results in adult life, flat faces, spaced teeth, and poor relation of teeth to facial contour prove that you cannot alter the size and shape of the dental arches even though you remove teeth. It is doubtful whether, through early extraction you can prevent any forward development of the jaws. Unfortunately, mechanical concepts have dominated the practice of orthodontics to the elimination of the physio-biologic concept. Over a period of years, starting with Bonwell's triangle and charts, attempts have been made to work out tooth positions and tooth relationships with a mechanical formula. The variations involved in orthodontics have made all mechanical predeterminants a failure. It is impossible to predict development.

I know that my opponents will agree with me in condemning the extraction of teeth by the inexperienced practitioner. Many men seem to be following the dictum that if you don't know what to do in a case of malocclusion—extract. The studies involved in the correction of an orthodontic case are involved. It is difficult even for one of experience. To the inexperienced, extraction seems like a short-cut but it leads to sorry results.

I do not extract but I have had sent to me many cases in which teeth had been extracted. The advocacy of extraction by experienced men such as my opponents has led inexperienced men to experiment with this dangerous procedure. Let me cite a few cases referred to me for completion of treatment in which all will agree extraction should not have been tried.

I have had sent to me a Class III case in a boy of seventeen in which the upper canines had been extracted; a Class II, first division, case in which the lower premolars had been extracted, and not any upper teeth extracted; a Class I case in which the upper laterals had been extracted, and several cases in which

lower second premolars had been removed in a Class II, first division case. Needless, to say, in spite of our best efforts, these cases were sorry compromises in the result we were able to achieve. You cannot expect an orthodontist to get a fine result where extraction has mutilated the mouth.

The whole subject of orthodontics is a study in variations; there is nothing fixed. We have variation in crown-root relationships; the axial inclination in relation to the bone varies. Just as there is no standardization in the eyes, hands, or feet, so the two jaws vary. This variation must be evaluated in treatment.

I do not extract because in nearly thirty years of orthodontic practice and the treatment of thousands of cases I have been able, by close attention to physiologic principles and adaptation of treatment to these principles, to produce in more than ninety per cent of cases an occlusal relationship and facial balance which have been maintained within physiologic limits as evidenced by check-ups fifteen and twenty years after the end of treatment.

This percentage of successfully treated cases is not unusual. Since beginning the preparation of this paper, I have asked many men of long experience in orthodontics, "What do you consider your percentage of successful results, three, five or more years after the removal of all appliances?" The answer in every case was from eighty-five to ninety-five per cent. When one considers the difficulties of orthodontics, this is a remarkable record. The men interviewed do not extract except in very rare instances. With this in mind we wonder why other men have such a high percentage of failures that they are driven to extraction as a way out. Upon considering the records of the outstanding advocates of the extraction theory we find that all use the same appliance for their corrections. One is suspicious that their loyalty and enthusiasm for a multiple-band mechanism may be responsible for many of their failures. Such a mechanism is limited in scope and does not conform to physiologic principles. Hence, we find extraction resorted to.

There are many hundreds of successful orthodontists treating thousands of cases. The number who extract routinely is relatively small. Perhaps it is the appliance which is at fault and if operators would abandon the multiple band technique they might find no need for extraction.

My records show that I have extracted on the average of once in about eight hundred cases and I did not improve the results in those cases by extracting. The men who extract claim that without that expedient their success was only fifteen to twenty per cent. If my efforts were so meagerly rewarded, I would abandon orthodontics and make a living in some way in which I did less harm. Extraction is not an "easy out." It complicates rather than simplifies practice. In my opinion, the results of extraction are unsatisfactory for the life cycle of the patient's dentition.

I have no quarrel with Drs. Strang and Greenstein. They are men of experience and skill whose integrity I respect. However, I am fearful of the results of their procedures if generally adopted. We must keep in mind: If you don't know, don't try. Don't experiment; a child's mouth may be ruined. Remember that famous orthodontic quotation attributed to Fauchard:

"Your results are monumental evidence of your ability and skill or damnable deformities of your own creation."

THE ADVISABILITY OF EXTRACTION AS A THERAPEUTIC AID IN ORTHODONTICS: NEGATIVE*

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SINCE this presentation is intended largely for general practitioners of dentistry, it was accepted with the feeling that consideration will be given of *general principles,* to serve as a *guide* for advice to patients. Therefore, what I shall present has been prepared on this basis. I hope that it may be helpful in the formation of a safe perspective regarding the age-old problem of the extraction of healthy teeth as an aid in orthodontic therapy.

It was my privilege to have arranged for Dr. Charles H. Tweed to come to New York to direct the courses in which he propounded the principles underlying the treatment procedures which he advocates and the application of the Angle edgewise mechanism which he uses. I learned much from him in these courses.

Dr. Tweed impressed me as being a ruggedly honest orthodontist, bristling with the courage of his convictions. He candidly stated that the unswerving principle of non-extraction as taught him in the Angle School of Orthodontia resulted in so many failures that he was forced to reverse his methods and resort to extraction to make it possible for him to produce satisfactory results. He stated further that he extracts mostly four, sometimes only two, bicuspids in over 70 per cent of his cases, which means in seven mouths out of every ten treated.

I have been unable to get from Dr. Tweed or his followers a clear explanation of what the so-called "Tweed Theory" embraces. He lays much stress on (a) what he terms "basal bone," (b) too much tooth material in the jaws, (c) excessive labial inclination of the incisal or anterior segments of the dental arches, and (d) an ideal face form that is flattened in its lower third about the mouth which he speaks of as a "flat-puss face." As I have been able to grasp it, these combine to form the basis of the theory that has been named for him.

What I shall say must please be accepted as being strictly impersonal. I have a deep respect for the man whose "theory" we are considering. I regard him as a master clinician and accord to him and his followers the quality of sincerity. May I not ask that they be equally generous toward me. We all are diligently searching for the truth so that we may apply it in improving the service rendered our patients.

Dr. Tweed has stated that he and all graduates of the Angle School of Orthodontia were taught that it was "heresy" ever to resort to extraction in orthodontic treatment. Dr. Angle propounded as a guiding principle that the jaws, under the stimulus of gentle pressure of the right appliance, could be grown to a size and form that would accommodate any natural human detention.

*Read in a Symposium before the Greater New York Dental Meeting, Dec. 10, 1946.

Because of this, the graduates of his School soundly denounced anyone who dared suggest extraction as a means of aiding treatment.

Dr. Calvin S. Case, a leading orthodontist of Dr. Angle's day, advocated extractions in some treatments as the only means possible of combining occlusal efficiency with a pleasing facial balance. This was about 1892—54 years ago—and before Dr. Angle limited his practice to orthodontics.

The battle has been waged between these two methods of practice ever since. The Angle graduates were organized and in sufficient number to make it most uncomfortable for any orthodontist to report his ever having to resort to extraction in orthodontic treatment.

Slowly but surely, some progressive orthodontists found it necessary to extract, but in only a small percentage of cases. Reports of these in meetings were greeted with ridicule and sound condemnation from the opposition. This did not prevent them from continuing the practice but deterred them from reporting their cases. It has been stated that Calvin Case extracted in from eight to nine per cent of his patients.

In 1931 George W. Grieve[1] of Toronto, Canada, a graduate of the Angle School, reported his first treatment with extraction. It was illustrated by casts before treatment and one year after all appliances had been removed. He had four bicuspids extracted at the beginning of treatment in 1926. The result was gratifying. He continued to present papers in which he advocated extraction when warranted after careful study of each case. While four bicuspids were extracted most often, it was not limited to these teeth. Before any extraction was decided upon, radiograms of the third molar regions were carefully studied to determine their presence, size and form. His advocacy of frequent extraction was a radical departure from popular practice.

Charles H. Tweed, about ten years ago, came to the support of Dr. Grieve's contention. He announced his reversal of conviction and began the extraction of biscuspids, exhibiting casts of treated cases which were impressive. This served as the beginning of the popular wave entailing very frequent, if not almost routine, extraction of four healthy bicuspid teeth, occasionally only two, at about the twelfth to thirteenth year—a time before the root ends have grown to completion.

The "Tweed Theory," as I have been able to grasp it, consists of the extraction of bicuspids so that the anterior teeth mostly may be moved to a position where they are supported by what he terms "basal bone," and further, that this condition is essential to the retention of the teeth in their new positions. Extractions were made in the mouths of patients twelve years and younger. Some of the Tweed group have even gone so far as to suggest the removal of four bicuspid follicles. This would destroy the growth stimulus in the jaws of at least the teeth removed.

To me this is a very mechanical concept as the basis of solving the orthodontic problem. While mechanics has its place and becomes progressively important as the denture approaches completion, the basic principle of growth and development must be given prior consideration, and every effort made to stimulate growth to the maximum of the inherited possibilities of each patient. We

shall, therefore, review briefly and stress a few of the more important facts in the development of the face, jaws and teeth, for it is these that the orthodontist should have foremost in mind in determining the best age and procedure in treatment.

There are two great classes of influences that play a part in the developing child: first, *heredity* which is that given to us by our ancestors; this is sealed at the time of conception and cannot be changed thereafter; second, *acquired* or *environmental* influences which are operative from then on throughout life.

The following review of the progressive development of dentition is based on the work of Brady,[2] Broomell,[3] Logan and Kronfeld,[4] and Schour and Massler.[5]

All of the deciduous teeth and the permanent first molars have begun to form when the gestation period is about two-thirds through which is three months before birth. At birth there are present in the jaws the follicles of twenty-four teeth, namely the twenty deciduous and the four permanent first molars. According to the late T. Wingate Todd,[6] the period of most rapid *horizontal* growth of the jaws of the average normal child is from the twenty-first day after birth to the seventh month at which time the first of the deciduous teeth—the lower central incisors—usually begins to show through the gum. In other words, the most rapid horizontal growth of the jaws at any time in life takes place before any tooth has erupted. No wonder then that the gymnastics of natural suckling is so important in stimulating jaw growth and especially in developing the mandible and its articulation forward into its normal position in relation to the head.

Vertical growth now speeds up as the deciduous teeth grow toward eruption and into occlusion. Horizontal growth continues but at a slower pace. The formation of the second permanent tooth follicle begins about the fourth month after birth when the lower and upper central incisors begin to form along their incisive edges. The deciduous teeth should be in occlusion by the third year and their root ends completed by the fourth year. At this time the child's jaws support forty-four teeth—twenty deciduous teeth in occlusion plus twenty-four follicles for the permanent set. The crowns of these teeth attain their full width very soon after initial formation and the *second* period of most rapid horizontal jaw growth manifests itself from the fourth to the seventh year.[6]

This is explained by the fact that, from the fifth to the seventh year, the jaws contain forty-eight teeth and follicles, the greatest number of any age in life. The permanent incisors are moving toward their eruptive positions in the incisal segment of the arch. Developmental spacing of the deciduous incisors should be apparent.

The thorough chewing of tough, resistant foods is especially important in this period of jaw growth. It stimulates the flow of blood with its nutrient growth-supporting elements to the jaws and teeth. It is undoubtedly a potent factor in positioning teeth and their roots to be surrounded with adequate bone for their support.

The shedding of deciduous teeth begins in this period, to be followed closely by the eruption of their permanent successors. The care of the deciduous dentition is of greatest importance in assuring the proper positioning of the permanent teeth. The dentist is here responsible for care that is of utmost value to

the orthodontic welfare of the patient. The basic essential to a *normal* permanent dentition is that the permanent first molar erupts in its *normal distal position.* This is assured by the maintenance of the full mesio-distal width of the buccal segments of the deciduous arch. Fillings involving proximal surfaces must fully restore the original width of the tooth. Should any of the deciduous teeth be *prematurely lost,* the space must be maintained or the permanent first molar which normally contacts the distal surface of the second deciduous molar will shift to the mesial and the first step toward a crowded permanent arch and the possibility of need for subsequent extraction will have been taken. If there is a tendency toward closure of the space from which a deciduous tooth has been lost, a space retainer is positively indicated. In the anterior segment of the jaws, two deciduous teeth should never be extracted to make space for the eruption of one permanent tooth.

It is common knowledge that the percentage of normal occlusion of deciduous teeth is much higher than with the permanent set. After years of careful observation we cannot help but feel that this is due in large measure to the lack of proper dental care given deciduous teeth. They are just as important, yes, even more important, than the permanent set and their proper care is one of the cardinal factors in producing normal occlusion of their successors. With deciduous teeth properly carried through to the eruption of permanent successors, the need for extraction is very greatly reduced.

If the deciduous arch and the developing tooth follicles are normal in growth, size and position, there being contained forty teeth and follicles at this age—twenty deciduous teeth and twenty follicles for permanent successors—and the permanent first molars are in normal occlusion, there is little need for additional *horizontal* growth mesial to the permanent first molars. However, much vertical growth must take place to accommodate the longer and larger roots and crowns of the permanent successors. This continues until the bicuspid and cuspid roots are completed at about the fifteenth to sixteenth year. Indeed, the lower anterior part of the face, prominent in which is the chin, continues to grow until about the twentieth year. When growth anterior to the permanent first molars is abnormally slow, it becomes necessary to stimulate both horizontal and vertical growth very much beyond the seventh year. When extraction seems probable, the age at which it is done is of essential importance.

The eruption of the first bicuspid tooth usually takes place about the tenth year and the second at about the eleventh year. Their root ends are not completed until about the fourteenth to fifteenth years. The stimulus of the growing roots in the apical areas is an important factor that should not be disregarded, especially when Tweed puts so much stress upon so-called "basal bone." Therefore, to take advantage of the full growth urge of the bicuspid roots in forming their own apical support, they should not be extracted before the roots are completed which is about the fifteenth year.

This brings us to the *third* most rapid period of horizontal jaw growth which, again quoting Todd, is from the sixteenth to the nineteenth year. To extract teeth before the full developmental urge, plus the stimulation of normally masticating teeth, has been reached is to disregard one of the most important

factors in aiding the jaws to attain their full growth possibilities. The cuspid erupts at about the twelfth year and its root end is completed about the fifteenth year. The permanent second molar erupts about the thirteenth year and its roots are completed about the sixteenth year. The third molar varies in the time of its eruption, ranging from the sixteenth year on, while the root ends are completed from the eighteenth to the twenty-fifth year. It is safe to assume that so long as it is unerupted—unless it is fully formed and definitely impacted—it is exerting a growth stimulus, mostly in a distal and vertical direction, as has been proved by the work of Lawrence Baker.[7]

This review, though much abridged, is important, we feel, in emphasizing the biologic factors underlying tooth and jaw development and growth, especially as it bears on the bone formed by growing root ends versus the mechanical concept of eliminating this growth stimulus by the early extractions advocated in the Tweed group.

I do not have a clear understanding of when or how "basal bone" is formed or just where it is located. It must, however, be a part either of the body of the jaw or of the alveolar process or a combination of the two. I do know, however, that roots of teeth growing to their completion under the stimulating stress of masticatory function must exert an influence upon the quantity and quality of bone about their apices. Structure and function must always be closely linked, with function dominating structure and acting as the major factor in determining form. Bone is a living, constantly changing tissue, active throughout the entire life of the individual. It reacts by building resistance to all strains brought upon it. This is important concerning all teeth but especially the incisors when considering axial inclination.

Axel F. Lundstrom of Stockholm, Sweden made an extensive investigation of this problem over a quarter century ago. He published a report entitled "Malocclusion of the Teeth Regarded as a Problem in Connection with the Apical Base."[8] This was in 1923, consisted of 150 pages and was generously illustrated by reproductions of casts selected from 650 cases treated in his practice spanning a period estimated to be over twenty years. Its study is commended to everyone interested in the extraction problem.

Lundstrom describes the root of a tooth as divisible into three zones—gingival, cervical and apical. The apical zone embraces approximately the apical half of the root. He combines the surrounding bony structure and the peridental membrane with this to form what he terms the "apical base" which is developed as the teeth grow and erupt, function being the most stimulating factor. He says "The alveolar process has been regarded as a region in certain respects independent of the jaw bones and intimately connected with the presence of the teeth. From the description, however, of certain peculiarities in the pathological anatomy of the region in question, it would appear that the alveolar process and the position of the teeth are dependent upon the form of the apical base. When the latter is normal, and only then, is a normal position and a normal occlusion of the teeth possible."

He points out that *two* arch forms should be considered; one is that formed by the crowns of the teeth and the other the arch formed by the roots of the

teeth at their apical base. He quotes Brady in his article as follows: "The greatest factor in the development of the dental arches comes from the stimulation to the parts that normal use gives and it is from this that normal growth is most promoted and finally attained."

The so-called "Tweed Theory," as I gathered from his lectures and from his statements since, is based wholly on a mechanical concept. There seems to be little or no effort made to stimulate growth by doing what my good friend Maxwell Stevens of London terms "nudging Nature when she lags" in producing growth and development.

The Tweed concept, as I interpret it, has for its objective the removal of four bicuspids, occasionally only two, to reduce the size of the dental arch so that the remaining teeth may be moved into nice alignment and efficient occlusal contact in harmony with pleasing facial lines, reducing the size of the dental arch by extractions and placing the root ends in what he terms "basal bone." By so doing, it is proclaimed that relapse but very seldom occurs.

These latter are noble objectives and are indeed the very basis of the science of orthodontics. However, the great majority of observant and studious leaders in the specialty recognize growth as the predominant factor in the attainment of these objectives. They believe with Lundstrom "that the size of the jaws is influenced by the development of the dental arch,"[8] for the normal accommodation of the teeth and are, therefore, opposed to the principle of routine and early extraction.

Such practicing orthodontists, also well recognized as investigators in the field, as Atkinson, Baker, Brady, Broadbent, Brodie, Hellman, Lundstrom, Mershon, Noyes, Oppenheim and Rogers, as well as many other students of this problem, are definitely opposed to the principle of frequent and early extraction. Their opinion is based on the sound biologic principle of growth and development as the natural means by which to align all teeth and is, therefore, opposed to the mechanical concept of reducing the size of the dental arch by extraction for the alignment of remaining teeth. They seek to attain identical objectives by retaining the full complement of teeth in all but a comparatively small percentage of cases, these being definitely abnormal.

Dr. Tweed speaks of his ideal face with much emphasis and shows slides to illustrate his contention. By extracting the bicuspids and moving the anterior segment lingually or distally to close the spaces created, he stresses the advantage of thus placing the upper and lower incisors in relatively vertical position to the facial line as seen in profile. This tends to produce what he speaks of as the desirable "flat-puss face."

To me it seems quite unsound to attempt to produce routinely a type of face regardless of inheritance or racial type. The upper anterior teeth with supporting bone cannot be moved lingually without resulting in a corresponding flattening of the face. This involves not only the upper lip but must have an effect on the lower part of the nose. The end result of such a change must be given careful consideration for at least in a percentage of patients this might mar instead of improve facial balance.

That definitely unbalanced occlusions and facial lines exist as growth nears completion is a fact generally recognized in orthodontics. These are frequently abnormal to a degree of being so disfiguring as to be a handicap in life if left uncorrected. In such cases, extraction is often the only basis of successful treatment. Facial lines are paramount and a compromise of occlusal efficiency by the extraction of some teeth is justified.

In reviewing the treatment records in our practice during the past fifteen years, we find that we have had teeth extracted in about ten per cent of patients—this being one patient in every ten treated. One-half of the extractions were of only one tooth, a lower central incisor.

The general rules followed in making the decisions to extract were as follows:

Bicuspids: *Uppers,* two only when maxilla is definitely in protrusion, the mandible being in proper relation to the head. In rare cases, only one, when the median line is definitely shifted to one side.

Lowers, two when the mandible is definitely in protrusion and the maxillary teeth are in harmonious relation with the cranium and facial lines.

Uppers and *lowers,* four when bimaxillary protrusion was disfiguring.

Lower Incisor:

Bicuspids were never extracted from the mandible when the posterior teeth are in good occlusion until after a careful survey has been made to determine whether the removal of one lower incisor will not permit the incisal segment to be reduced sufficiently in size so that the lower and upper incisors and cuspids are in safe functional relations.

This has been my practice for the past twenty years and it has saved the extraction of lower bicuspids in over fifty per cent of the extraction cases in my practice. I have followed this procedure with increasing satisfaction for aligning the lower anterior teeth in cases of relapse some years after treatment. These latter extractions are rarely made before the eighteenth year and often not until the twenty-fifth year or beyond.

It is essential that appliance therapy follow immediately after extraction to prevent the teeth adjoining the space created from tipping toward each other, thus destroying proper axial inclination. It is my practice to have five lower anterior teeth and the anchor molars banded in advance of extraction and ready for the arch. This is inserted about three days after the extraction and is allowed to remain passive for about six weeks before applying pressure to close the space. This time lapse allows for osteoid or bone matrix to form in the socket.

SUMMARY

I. Growth of jaws and face should, as a principle, be thoroughly stimulated to the maximum of their inherited possibilities before interfering with the growth urge by the extraction of healthy teeth.

II. Since it is impossible to foretell at just what age unusual spurts of jaw and face growth will take place and to what extent, and since growth normally continues well beyond the eighteenth year, it is only in extreme cases that extraction of bicuspids should be resorted to much before this age. The crowns

of teeth are full size when erupted while the jaws and face continue to grow beyond the twentieth year.

III. In a comparatively small percentage of cases, which may vary considerably in racial admixture and in different strata of society, mostly dependent on the quality of dentistry done for the child, the amount of tooth material and jaw size will make it impossible to produce a stable occlusion in harmony with facial balance without removal of some teeth. The number of teeth and the class of tooth should be decided for each case individually. The smallest number of the least important teeth should be condemned to extraction.

IV. The removal of teeth does not correct the malocclusion. Self-correction following extraction but very seldom takes place; therefore, appliance therapy must almost invariably follow. Orthodontic treatment after extraction is in many cases more exacting than before.

V. We believe that there is a middle course, somewhat as practiced by Calvin S. Case[9] over fifty years ago, which has been quietly followed by studious and careful orthodontists, that will eventually prevail as the sound, guiding principle of practice in orthodontic treatment.

VI. It is our belief that inestimably greater harm is resulting from ill-advised extraction of healthy teeth for correction of malocclusion that has been done in the past fifty years by following the Angle dictum of non-extraction in orthodontic treatment.

CONCLUSION

1. When in doubt, *never* extract.

2. First study each case fully and, if extraction is decided upon, have a definite plan of treatment clearly outlined in advance. Self-correction of malocclusion is a myth that is potent for more harm to our patients than any factor that now faces dentistry.

3. *If the dental arches are too much narrowed, as by extraction, proximal contacts cannot be retained and spacing will result since the tongue, in size and function, will always have the last word.*

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Editorial

Extraction of Teeth in Orthodontics

TOOTH extraction as an adjunctive measure in orthodontic procedure is neither a new fad nor a panacea for the elimination of malocclusion. It is as old as the practice of orthodontics itself. In the present issue of the JOURNAL, the pros and cons of "The Advisability of Extraction as a Therapeutic Aid in Orthodontics," are presented in four papers which were read before the Greater New York Dental Meeting in December, 1946.

The present controversy on extraction can be laid directly to the so-called "Tweed Philosophy." This is actually a procedural method propounded by Dr. Charles H. Tweed of Tucson, Arizona. Doctor Tweed is an outstanding clinical orthodontist and has been for many years a keen observer of orthodontically treated patients. He found that in their attempt to correct irregularity of arrangement of the teeth orthodontists expanded and "rounded out" the dental arches only to find that their efforts were followed by "collapse," and frequently by the intensification of existing bimaxillary protrusion or the establishment of bimaxillary protrusion where it did not previously exist.

Tweed has shown that "collapse" in the incisor region after orthodontic treatment is due mainly to the fact that these teeth are wittingly or unwittingly positioned by the operator during treatment anteriorly to the medullary bone of the mandible. When the mesiodistal configuration of the teeth in a dental arch is too great to allow the incisor teeth to be accommodated in normal occlusion over the medullary bone, and approximately at right angles to the base of the mandible, Tweed offers a way out of the impasse through the reduction of the mesiodistal configuration of the dental arches by the extraction of a first premolar tooth, or some other tooth if that is more advisable, in each jaw quadrant.

There are few men today who would insist that extraction has no place in orthodontic practice. The important question is not whether to extract but under which circumstances shall extraction be resorted to as an adjunct to orthodontic mechanotherapy.

Both the proponents and opponents of extraction in orthodontics err when they discuss the subject in terms of overcoming crowding of individual teeth or even of groups of teeth. Extraction is to be resorted to only when the *Basal Arches,* the bone subjacent to the mandibular alveolar process or superjacent to the maxillary alveolar process, is too constricted to permit the normal arrangement of the teeth in the dental arches without bringing these teeth beyond the medullary investing bone of their roots, and/or positioning these teeth so that they are in procumbent position to the base of the mandible. Extraction as Tweed employs it is related to obtaining normal arch relationship and not merely as a convenience for aligning crowded teeth.

There is great danger at present that the recrudescence of the controversy on extraction as a therapeutic adjunct in orthodontics may lead the general practitioner of dentistry to adopt extraction not as an aid to mechanotherapy but as a sole method for the elimination of malocclusion.

In a series of studies* dealing with the shifting of teeth after extractions when not followed by orthodontic control, it was found that extraction *per se* cannot be relied on to correct crowding of teeth nor can extraction be resorted successfully as a sole means for the elimination of malocclusion as it manifests itself in the various classifications established by Angle. In those cases which showed improved occlusion after extraction, such improvement was purely accidental and the result of other favorable conditions present in the mouth which did not permit the usual promiscuous shifting of the remaining teeth in the dental arches but guided them instead into a favorable relationship.

For the dentist to extract sound teeth and dismiss his patient in the hope that the remaining teeth in the mouth will find their own way to favorable positions without orthodontic supervision and treatment may well be considered an act of malpractice.

J. A. Salzmann.

*Salzmann, J. A.: The Rationale of Extraction as an Adjunct to Orthodontic Mechanotherapy and the Sequelae of Extraction in the Absence of Orthodontic Guidance. Am. Jour. Orthodontics and Oral Surgery 31: 181-202, April, 1945.

Round-Table Discussion

Some Limitations in Orthodontic Treatment

Various classes and types of cases were shown in which treatment had been undertaken at different stages of denture development. The first was a Class II, Division 1 (Angle) case in the complete deciduous dentition at 3½ years of age. This first period of treatment was successfully completed, but the case relapsed at the age of 7½ years when the permanent incisors erupted.

The next was a Class II, Division 1 case in the mixed dentition at the age of 7½ years. A first period of treatment undertaken at this stage resulted in relapse when the patient reached the age of 12 years.

The next shown was a Class I case with complete collapse in the anterior region of both arches. Treatment was begun at the age of 9 years but failed to achieve the desired result. At the age of 12 years a compromise was resorted to, and the case was retreated by the removal of four premolars.

The next was a Class I case at the age of 15½ years with complete anterior collapse in both arches, which had been treated by orthodox methods. After two years, treatment had failed in at least two objectives, viz.: the obtaining of normal occlusal relations and facial harmony. Compromise treatment involving the removal of several teeth was then resorted to, with a much more desirable result.

Several other cases were shown in which extraction was resorted to from the beginning of treatment. These showed striking clinical results in which marked occlusal and facial changes were obtained by retracting the anterior segments. These cases were further assessed by cephalometric findings, showing a continuous forward movement of the denture with growth, even though clinical findings exhibited a marked retrusion in the anterior segment. One of these cases showed a relapse after removal of several teeth, in the direction of the original case.

Summary.—Analysis of these cases seems to indicate the presence and persistence of a growth pattern and functional form possessed by each individual, which frequently defies our best mechanical efforts. It is for us to study and analyze each case to determine better the direction of this growth pattern, and thus outline our treatment to aid rather than to hinder its path.

A. Goldstein.

REMARKS ON THE PRESENTATION OF THE ALBERT H. KETCHAM MEMORIAL AWARD, 1946, BY FREDERIC T. MURLLESS, JR.

Mr. President, fellow members of the American Association of Orthodontists, and guests: The history of the specialty of orthodontics is made up of the personal contributions of numberless men and their devoted efforts to solve the biological, histological, and technical problems which are today recognized as absolutely interdependent and essential to each other.

In the more recent years, beginning in a period now largely forgotten, there have been many miles of travel and unceasing correspondence and study shared by a widely scattered group of men in the search for orthodontic knowledge. As truths were established and facts were reconciled, an educational atmosphere was developed which led eventually to the organization of the American Board of Orthodontics.

In this, along with his inspiring self-sacrificing efforts to spread the knowledge which was becoming the basis of the science of orthodontics, Dr. Albert H. Ketcham was one of the foremost leaders. After Dr. Ketcham's death, and as a perpetual memorial to him and a pledge of our allegiance to his personal and professional ideals, the Albert H. Ketcham Memorial Award was established by his grateful friends. Since then and in connection with the meetings of this American Association of Orthodontists, certificates of merit have been presented to a number of our distinguished members in recognition of their signal contribution to the science of orthodontics.

On this occasion I have the honor and it is my pleasant duty to make this presentation to one of our outstanding members, Dr. Raymond Clare Willett. In naming him as the recipient of the Albert H. Ketcham Memorial Award we remind ourselves of the debt of gratitude which is owed to him because of his contribution to the science of orthodontics and to the development of our humane institutions.

It is now five years since Dr. Brandhorst presented Dr. Willett before the chancellor of Washington University at St. Louis, and recommended him for the honorary degree of Doctor of Science. In this citation, reference was made to the humanitarian principles which permeate his practice and his career, and it also referred to him as an outstanding public benefactor.

The tribute paid him by Dr. Brandhorst at that time was in every sense a deserved recognition of Dr. Willett as a man of benevolent and humanitarian instincts. The many who have been inspired by him as a teacher and essayist warmly approved the Award, and those of us who have known him through the years are still grateful that he should have received this signal honor as a distinguished alumnus of a great university which did itself proud in celebrating the anniversary of its founding.

In these after years, when we know him much better and with added perspective see him even more clearly, we here today offer him still further

honor. We note that he has written much and well and instructively of his technical discoveries and their application to previously unsolved orthodontic problems. We remember that he has appeared before orthodontic and dental organizations many scores of times and in every section of our country, while at the same time carrying on a practice drawn from an ever-widening area.

That so many of us are indebted to his responsiveness and cordial willingness to become our teacher for the mere asking is heartening indeed. We realize that every child from this time on will be perpetually indebted to him for opening wider the gate to children's dentistry. We believe that these are sufficient reasons for amplifying Dr. Brandhorst's brief but complimentary citation.

RAYMOND CLARE WILLETT

Men have written wisely and convincingly of what mere circumstance and environment have done to incite their admiration and to give proof of the greatness of their confreres, but too little is sometimes said of that unconscious, modest, purposeful effort which is characterized by self-effacement, self-detachment, and the absence of self-seeking, and the impact of innate altruism. From such wholeheartedness to such as are deserving comes tranquility and content-

ment. These fine attributes are the reward of hard won moments of placid self-forgetfulness, moments in which are woven the fabric of character. They are like the sheen and beauty of a pattern in damask. Once discovered they are never afterward overlooked. They represent the impact of altruism and are worn only by those who earn them, but they also do belong to those who have learned to see them and who have been inspired by them.

We, the American Association of Orthodontists and the American Board of Orthodontics, here on this occasion do honor to our specialty and to ourselves in presenting to Dr. Raymond Clare Willett this certificate as a symbol of our deep respect and admiration.

RESPONSE BY DR. RAYMOND CLARE WILLETT TO THE PRESENTATION OF THE ALBERT H. KETCHAM MEMORIAL AWARD

I thank you, Dr. Murlless, and members of the Joint Committee of the American Board of Orthodontics and the American Association of Orthodontists. Forming flowery phrases has never been in my line, and I shall not attempt it now in saying what I really feel at heart.

Dr. Frank Crane has written a long list of qualities which characterize friendship, and among them we find this statement: "Anybody may stand by you when you are right; a friend stands by you even if you are wrong."

According to that, your bestowal of this honor upon me comes under that qualification for true friendship.

The things with which you have so generously credited me with having accomplished throughout the years of my practice have been wrought out by the method of trial and error, with a determination to correct defects in technique to the best of my comprehension. As I look back, it seems that there are great heaps of dross from which a few useful ideas have been panned.

In accepting this Award my thoughts turn reverently to the man in whose memory this honor is given, Dr. Albert Ketcham. It is a great privilege to have listed him among my very good friends, and one who gave me much helpful advice and encouragement down through the course of many years.

My acquaintance with Dr. Ketcham dates from my first trip to Denver in 1910 when I attended the tenth annual meeting of this Association. The memory of a few pleasurable days when I was Dr. Ketcham's guest at their Lake Edith cabin can never grow dim. Returning to these mountains at this time refreshes and embosses this memory anew in my consciousness.

Again, let me say, I thank you.

REPORT OF COMMITTEE ON CONSTITUTIONAL AND ADMINISTRATIVE BYLAWS

Proposed Changes in Constitution and Bylaws

To Be Voted on at Next Regular Meeting

The Committee recommends that Article IV, Section 3, of the Constitution be amended by striking out the words "New York" under Item No. 1, and substituting the word "Northeastern." The amendment will read: "1. Northeastern Society of Orthodontists."

The Committee recommends the following changes in the bylaws: That Chapter I, Section 7, of the Bylaws, be amended by striking out, starting in the second line, the words "may retain membership by paying the annual dues, or" and by striking out the period at the end of the section, inserting a comma, and adding, "elected to honorary membership as hereinafter provided." Section 7 as amended will read: "Section 7: A member discontinuing practice may be placed on the retired membership list by action of the Board of Directors, or may be re-elected to honorary membership as hereinafter provided."

That Chapter I, Section 10, be amended by adding in the third line, after the word "and," the word "persons." Section 10 as amended will read: "Section 10: Honorary members shall consist of persons who are members in good standing in their dental or medical organizations, or persons eminent in the collateral sciences, all of whom have made outstanding contributions to the science and art of Orthodontics, and of members of this Association, retired from practice, who have rendered valuable services to the organization."

That Chapter I, Section 14, be amended by adding, in the second line after the word "Association," the words "except voting and holding office," and after the word "publication" the words "if he desires it." Section 14 as amended will read: "Section 14: The service member may have all the privileges of the Association except voting or holding office, but must pay the costs of the official publication if he desires it."

That Chapter II, Section 2, of the Administrative Bylaws be amended by striking out, beginning in the first line, the words "be entitled to"; that Section 2 be further amended by striking out in the fifth line the word "may" and inserting the word "shall"; that Section 2 be further amended by striking out in the sixth line the word "may" and inserting the word "shall." Section 2 as amended will read: "Section 2: Each Constituent Society shall elect one Director to represent the respective Societies on the Board of Directors. At the time of the election of the Directors, the Society shall elect one alternate, and the alternate of each Director shall act in the absence of the regular Director at any annual meeting of the Association."

That Chapter V, Section 4, be amended by striking out the twenty-fourth line and inserting "the guests specifically invited by the Association." The sentence as amended will read: "It shall arrange for hotel accommodations for guests specifically invited by the Association."

That West Virginia be removed from the Great Lakes Society and transferred to the Southern Society. That the present Chapter VII be striken and that a new Chapter VII be adopted to read as follows:

"Chapter VII: Nomination and Election of Officers: Section 1: This Association at its annual meeting, at the business session, immediately following the scientific program on the afternoon of the second day, shall elect a President, a President-elect, a Vice-President, and a Secretary-Treasurer.

Presented at the meeting of the American Association of Orthodontists, Sept. 30-Oct. 3, 1946.

"Section 2: There shall be a Nominating Committee consisting of the seven elected Directors of the constituent Societies or their alternates, also one member-at-large, and the President of the American Association of Orthodontists.

"The President shall be the presiding officer of the committee. He shall have the power to vote in case of a tie.

"This Committee shall present nominations for the office of President-elect, Vice-President and Secretary-Treasurer.

"The Committee shall present such nominations at the business session of the annual meeting immediately following the scientific program on the afternoon of the second day. Other nominations may be made from the floor."

Section 3: "The person receiving the vote of a majority of the members voting shall be elected. Only members in good standing are priviliged to vote."

Section 4: "The President-elect shall automatically assume the office of President at the closing session of the annual meeting subsequent to his election."

That Chapter VIII, Section 2, subsection C, be amended by changing the period after the word "ballot" to a comma, and adding "except in the event only one nominee is presented for an office, the Association may instruct the Secretary-Treasurer to cast one ballot for the nominee."

Chapter VIII, Section 2, subsection C, as amended, will read: "C: All elections shall be by written ballot, except in the event only one nominee is presented for an office, the Association may instruct the Secretary-Treasurer to cast one ballot for the nominee."

That Chapter III, Section 2 be amended by striking out the period at the end of the section and adding the words "subsequent to his election." And that Section 2 be further amended by adding "In case of the death, resignation or removal of the President from office, he shall succeed to this office."

Chapter III, Section 2 as amended will read: "Section 2: The President-elect shall assist the President in the performance of his duties. He shall be a member ex officio of all committees and shall succeed to the office of President at the last business session of the Association at its annual meeting, subsequent to his election. In case of death, resignation or removal of the President, he shall succeed to this office."

The Committee feels that this change in Chapter III, Section 2 would necessitate a change in Section 3. Section 3 would be amended by striking out the sentence "He shall succeed to the office of President in case of vacancy," and substituting "He shall succeed to the office of President in case of the death, resignation or removal of the President and President-elect."

Chapter III, Section 3, as amended, will read: "Section 3: The Vice-President shall assist the President in the performance of his duties. He shall appoint a Reference Committee of three members to receive and consider the President's address, and shall cause this Committee to report its recommendations to the Association. He shall succeed to the office of President in case of the death, resignation or removal of the President and President-elect. He shall serve until his successor is elected and installed."

Respectfully submitted.

PHILIP E. ADAMS,
H. C. POLLOCK,
OREN A. OLIVER—Chairman.

Department of Orthodontic Abstracts and Reviews

Edited by

DR. J. A. SALZMANN, NEW YORK CITY

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The Cultural Understanding and Appreciation of the Scientific Approach: By Ralph H. Ojemann, The State University of Iowa, Iowa City, Iowa, *Science* **104**: 335-338, Oct. 11, 1946.

Scientific knowledge, as every investigator knows, exists in all degrees of refinement, ranging from relationships that have been established with a high degree of probability (or a low probable error in the basic measurements) through less well-established generalizations to untested hypotheses. The degree of refinement determines the extent to which we can predict the probable result when knowledge is used in planning how to control the environment and ourselves. It determines the extent to which we can plan a course of action which will have the result we desire. For example, in the present state of knowledge there appears to be some relationship in young children between diet and tooth decay. It also appears that factors other than diet are involved in the production of caries. But what these factors are is not definitely known. An important one may be fluorine. The details of the relationships are, however, not clear. If the parent wishes to produce good teeth in his child he cannot logically expect that careful control of diet will certainly assure that the child will have perfect teeth when he takes him for his first visit to the dentist. Neither can the dentist assume that, because the child has many imperfections or cavities, the parent has neglected dietary principles. The parent may have been neglectful. but before one can infer this from the condition of the child's teeth, the probable errors of the data expressing the relation of frequency and extent of caries to the food eaten must be reduced considerably.

Oral Diagnosis and Treatment: By Samuel Charles Miller, D.D.S., F.A.C.D., Associate Professor in charge of the Periodontia Department, New York University College of Dentistry, and 30 contributors. Second Edition. 613 illustrations including 39 color plates. Pp. 903. Price $10.00. Philadelphia, The Blakiston Company, 1946.

This second edition of *Oral Diagnosis and Treatment* has been aptly subtitled "A Textbook for Students and Practitioners of Dentistry and Medicine." In the ten years since the first edition of this work, there has been a tremendous expansion in the methods of diagnosis and treatment of oral diseases. So great has been the advance that the authors of the book have completely rewritten every chapter.

The text is complete and contains the very latest developments on such various subjects as aerodontia, penicillin therapy and dosage, diseases of the salivary glands, the relationship between oral and systemic diseases, the successful control of dental caries, the setting up of occupational dental programs, etc. Hundreds of other questions on modern procedure in the handling of fractures, vitamin therapy, psychosomatic dentistry. etc., are answered.

A brief review such as this makes it impossible to describe the book adequately. A list of its chapters would reveal that the work is almost a complete dental and oral medical education, and a tabulation of the contributors would read like a "Who's Who in dentistry and medicine."

The material in the book is well presented and interestingly written. Mechanically, the type is large and the paper of a quality that brings out roentgenograms and halftones to perfection. All line cuts and halftone illustrations were executed by professional medical artists. This is one of the important books of the year and should be read by every dentist and physician.

L. R. B.

Dentistry. An Agency of Health: By Malcolm Wallace Carr, D.D.S., Director of Oral Surgery and Visiting Oral Surgeon, Metropolitan Hospital; Attending Oral Surgeon, St. Luke's Hospital, Knickerbocker Hospital, Polyclinic Hospital, Flower-Fifth Avenue Hospital; Consultant Oral Surgeon, Graduate School of Medicine, University of Pennsylvania, Philadelphia. Pp. 219. Price $1.50. New York, The Commonwealth Fund, 1946.

This book is one of a series of studies made by the Committee on Medicine and the Changing Order of the New York Academy of Medicine. The studies of this committee concern themselves with the general practice of medicine, public health, nursing, hospital administration, and the provision of health service by government. Carr, with the aid of his contributors and a subcommittee, presents a comprehensive picture of dentistry in the United States. Included in the book are the history, present activities, problems; and indications of future trends in the field of dentistry. Summarized material is presented on the growth of dental research, education, and legislative regulation. A discussion of current problems in the distribution of dental care includes the availability of dental service in rural areas, in industry, and among the public in general. The book will be of value to dentists, physicians, health workers, and the public in comprehending the general dental problem.

Carr sums up the dental problem by saying that ". . . the most urgent social problem in dentistry is the development of satisfactory procedures by which the benefits of adequate preventive, protective, restorative, and surgical dental health care would be promptly and conveniently available to every person." The conclusion is drawn that a complete dental health service for everybody in the United States would at present be impractical and uneconomical, while a dental health plan which would take care of children would have important health and educational benefits. This is in line with the sentiment expressed by the American Dental Association. The book is a concise presentation of the scope of the dental health problem. It has an important bibliography and is well indexed.

J. A. S.

The Dentist's Own Business. A Practical Study in the Management of a Dental Practice With Due Consideration of Its Ethical Responsibilities. By Arthur A. Campbell, D.D.S. Illustrated. Pp. 113. Wire-O binding. Price $3.50. Philadelphia, The Blakiston Company, 1946.

This book is especially directed to young men entering dental practice and to the returning veteran, although it may be found of value by any practitioner of dentistry. A section is devoted to the dentist and another to the assistant. Each is closely related so that the dentist and his assistant may well read both sections. Campbell pointed that a dentist can be a good businessman and still

be a failure. There are many factors that contribute to the success of the individual dentist. Practical examples are provided in office management routine. Such subjects as examination, fee estimates, payment arrangements, and collection are fully covered. Chapters are devoted also to the dental hygienists, children's dentistry, and the management of investments.

J. A. Salzmann

Oral Medicine: Diagnosis and Treatment: By Lester W. Burket, D.D.S., M.D., Professor of Oral Medicine, The Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania; Professor of Oral Medicine, Graduate School of Medicine, University of Pennsylvania. With a section on Oral Aspects of Aviation Medicine by Major Alvin Goldhush, D.D.S., M.S., D.C., A.U.S. 350 illustrations (60 in color on 10 plates). Pp. 674. Price $12.00. Philadelphia, J. B. Lippincott Company, 1946.

It is a far cry from the volume on *Oral Medicine* of which Burket is the author, to the works on the subject which appeared not so many years ago. In this volume are presented the various oral conditions which largely make up the no man's land that lies between medicine and dentistry. The many relationships between oral and systemic diseases are fully described and illustrated. The material is presented from an intensive, practical point of view. A perusal of this book by the dentist will tend to make patients' histories more meaningful. As it is, most of the information elicited in dental history-taking remains meaningless. Burket's description of the examination of the patient includes the psychological approach, laboratory procedures, and other methods, in addition to clinical observation.

In a special color atlas a group of 60 subjects is presented, illustrating oral lesions most commonly encountered by the physician and dentist. These colorings are arranged in such a manner as to make it possible to use them in conjunction with the diagnostic index which follows. The diagnostic index itself presents a classification grouping of the principal oral diseases, for ready reference for study. Section 4 of this volume is devoted to the discussion of diseases of the various systems of the body in relation to their oral aspects. Included are the diseases of the respiratory system, under which are presented the oral findings in common colds, ear and throat inflammations, and others. Under diseases of the cardiovascular system, we find discussion of the oral aspects of angina pectoris, coronary occlusion, and other cardiac disturbances. Under gastrointestinal diseases are included the various diseases of the mouth, the salivary glands, and those of other sections and systems.

Focal infection is discussed in detail, as are dental pediatrics, gerodontics (the treatment of dental disease in the aged), the hazards of dental practice, and dental diseases of occupational origin.

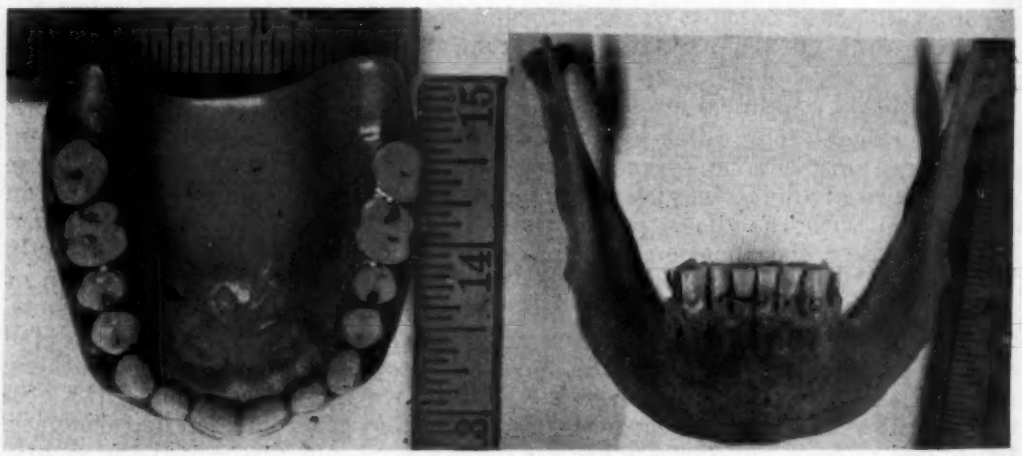
Can You Identify?

In cooperation with the police department of the State of Oregon and the University of Oregon, we publish herewith the following description and pictures of the dentures of the woman whose body was found in the Willamette River, with the hope that one of our readers may identify them.

The body of the torso case is probably that of a white woman approximately 5′ 2″ in height, weighing about 110 pounds, aged 48 years to 55 years, with hair once brown but now gray. The autopsy showed the upper part of the uterus had been removed; the appendices and ovaries were still present. No operational scar could be found on the exterior surface of the body. The body was removed from the Willamette River, between Oregon City and Portland, Oregon, March, 1946.

The upper denture is made of acrylic, probably with medium oval form teeth; the shade and mold of these teeth have been determined as SP Shade No. 15.

The upper denture has the lingual cusps of the molars ground flat, probably for the purpose of articulation with a lower partial denture which was not found on any part of the body.



Palatal relief was made on the denture, the anterior of which was ground out, and there is heavy postdamming, also lightly carved rugae. The labial is lightly stipled, has nicely carved festooning.

The teeth used are the old type True Bite which are not used today. The denture was probably made in 1940-1941. The manufacturers of RX39 definitely claim the denture material is not theirs.

The lower jaw shows all molars and second bicuspid teeth missing. There is considerable recession of the mandible in this region showing that these teeth have been out for some time and that a partial denture has been apparently worn, as the first bicuspid teeth show wear on the clasp region. There are labial class 5 foils in the lower left cuspid, lateral, central, and right central teeth, with caries starting around each of the foils.

The lower left central has a mesial occlusal silicate filling of considerable age. The right lateral tooth has extensive caries and could have had a gold foil at one time.

The right bicuspid has extensive labial caries, the occlusal surface or ends of all the lower teeth are heavily worn.

News and Notes

Southwestern Society of Orthodontists

Under the leadership of Dr. Brooks Bell, President, the Southwestern Society of Orthodontists recently completed one of its most successful meetings. There was a record attendance of 163 men for the twenty-sixth annual meeting which was held at Hotel Adolphus in Dallas, Texas, on February 2, 3, 4, 5, 1947.

The meeting commenced Monday morning with a presentation by two oral surgeons, Dr. Glenn R. Hillin and Dr. Earle Williams, of Dallas, pointing out the benefits of early extraction of third molars, which aroused a great deal of comment.

Mr. Jack Leach of Oklahoma City then presented a paper entitled "Popular Conceptions of Orthodontics," which was based on a survey of public opinion of orthodontics in Oklahoma City. This paper, which will appear in a later issue, motivated various considerations, and should be read and evaluated by all orthodontists.

At noon, a Dutch lunch was served at the D. A. C. Country Club, where the golf tournament was held. More than fifty took advantage of the mild weather and the sporting D. A. C. golf course.

That evening the nineteenth hole party and the golf dinner were held at the D. A. C. Country Club, with Dr. Nathan G. Gaston as toastmaster and Dr. Earle Williams assisting him. Professor R. E. Jackson, a part-time orthodontist, spoke on "Problems Concerning the Part-Time Practitioner of Orthodontics." Professor Jackson, who is head of the Department of Government at the Texas State College for Women, then regaled the members with a humorous talk on various subjects, bringing in quite a few of the orthodontic personalities present.

Golf prizes were then awarded, the winner being J. D. Peak of Austin, Tom Williams of Dallas, runner-up, and Martin J. Mayeau of Wheaton, Illinois, winner of the consolation prize. Winner of the guest prize was Dr. Robert W. Brumage. The winners received beautifully engraved sterling silver platters presented by the Southwestern Society; more than eighteen prizes were available for the other golfers with low scores.

Tuesday morning Dr. C. K. Madden, of Greenwich, Connecticut, presented two papers on the Johnson twin arch appliance, which were discussed by Dr. Nathan G. Gaston of Monroe and Dr. Dan C. Peavy of San Antonio. These papers evoked considerable discussion.

In the afternoon, a symposium on dental caries was given by Dr. Bernhard Gottlieb, Dr. Harry Crawford, and Dr. Harold B. Younger. The basis of this symposium was to point out that orthodontic appliances are not responsible for tooth decay. These papers will be available in a later issue of the JOURNAL. The Southwestern Society was very pleased that more than thirty-five local dentists came to the meeting on Tuesday to hear the symposium on dental caries, which was one of the most interesting features of the meeting. All of these men expressed much enthusiasm for this symposium.

Tuesday evening the cocktail party and dinner dance were held in the roof garden, with many local dentists attending.

Wednesday morning an introdoctrination breakfast was held at which Dr. Paul Guy Spencer, Chairman of the Introdoctrination Committee, presented the ten new members of the Southwestern Society of Orthodontists with the ideals and the objects of the Society. This breakfast is held each year for the purpose of explaining to the new members the ideals and purposes of the Southwestern Society. Following the introdoctrination breakfast, very interesting Table Clinics were presented by more than twenty members of the Southwestern Society. A business meeting was then held.

It was a privilege of the Society to have many out-of-state guests. Among them were Mr. Reginald V. Williams, President of the Williams Gold Company of Buffalo, New York, a friend of Dr. Paul Guy Spencer, to whom the program was dedicated. Dr. William A. Giblin of Montclair, New Jersey, and Dr. Martin J. Mayeau of Wheaton, Illinois, were also present.

Dr. William R. Humphrey of Denver, a regular visitor to our Southwestern meetings, was one of the men who discussed Dr. Gottlieb's paper. Dr. Humphrey, in conjunction with the third molar question presented by Dr. Hillin and Dr. Williams, gave a most interesting interview to the newspapers, in which he emphasized that lantern jaws were diminishing inasmuch as the bone structure was becoming smaller and smaller. Dr. E. B. Arnold, of Houston, was present with his usual witticisms.

Many wives were in attendance and several special events were arranged for them—a program tea at the Dallas Athletic Club on Monday afternoon, a style show Tuesday noon in the Adolphus Century Room, a cocktail party in the Danish Room, and the dinner dance on Tuesday evening. Wives of the Dallas orthodontists made up a committee headed by Mrs. A. B. Conly, of Dallas, to arrange these events. Visiting ladies seemed to enjoy the special occasions.

The Southwestern Society is very happy to welcome back seventeen of the members who were in service. All of these men have returned to practice in the Southwest and to active membership in our Society.

Dr. C. K. Madden of Greenwich, Connecticut, Dr. John E. McDermott, of Ottumwa, Iowa, Dr. and Mrs. Howard Yost, of Grand Island, Nebraska, and Dr. and Mrs. Walter W. Winter, of Decatur, Illinois, were other out-of-state guests.

All in all it was like every Southwestern Society meeting—everyone enjoyed seeing friends again, had plenty of fun, and took home some new ideas to work with and mull over until next year's meeting.

Dr. Bell is to be congratulated for the excellent manner in which he handled all sessions, both scientific and business. It is good to sit on the sidelines and enjoy the fine manner in which the younger men are carrying on and improving the traditions of our society.

Research on Dental Caries

Undernourished persons suffering from pellagra, scurvy, and other nutritional deficiency diseases tend to have less tooth decay than persons who eat average American diets, four research scientists reported recently in *The Journal of the American Dental Association.*

The researchers—Drs. Arvin W. Mann and Samuel Dreizen, dentists, Dr. Tom D. Spies, physician, and Floy Martin Hunt, all of Birmingham, Alabama—made detailed studies of dental defects among 124 patients at Hillman Hospital, Birmingham. The results were compared with similar studies made of a control group of 99 persons who exhibited no clinical evidence of malnutrition.

They reported that the group of 124 persons, all of whom showed definite clinical evidence of nutritional deficiencies, had less than one-third the amount of dental caries (decay) experience than that found in the well-fed group.

The average number of decayed, missing, and filled teeth (DFM rate) recorded for the 124 sufferers of nutritional deficiency diseases was reported as 4.54 per person, compared with an average DFM rate of 14.94 for the control group.

The results, the scientists reported, tend to refute an earlier belief that dental decay is directly related to the nutritional adequacy of the diet.

The undernourished patients, however, were found to be much more subject to periodontoclasia (pyorrhea). The researchers reported that 43 of the malnourished patients exhibited clinical symptoms of disease of the supporting tooth structures, while only 6 of the well-nourished group exhibited similar symptoms.

The scientists reported that the carbohydrate and fat intake of each group was about the same. The undernourished patients existed primarily on corn bread, syrup, and fat, the dietary staples of parts of rural Alabama, the scientists said.

Blood tests showed that only few of the well-nourished group were below normal levels in vitamins A, C, and E, and carotene, whereas in the experimental group, more than one hundred were low in two or more of these nutrients.

The study was conducted in cooperation with the Department of Internal Medicine of the University of Cincinnati.

Northeastern Society of Orthodontists

The next meeting of the Northeastern Society of Orthodontists (formerly New York Society of Orthodontists) will be held at the Waldorf-Astoria Hotel, New York, on Monday and Tuesday, March 10 and 11, 1947.

Central Section, American Association of Orthodontists

The Central Section of the American Association of Orthodontists will hold a scientific meeting at the Radisson Hotel, Minneapolis, Minnesota, on April 14 and 15, 1947—two full days of essays, case reports, and clinics.

District of Columbia Postgraduate Clinic

The District of Columbia Postgraduate Clinic (formerly the Five-State Postgraduate Clinic) will be held March 10, 11, 12, and 13, 1947, at the Statler Hotel, Washington, D. C., with Dr. James J. Greeves as general chairman.

Notes of Interest

Philip E. Adams, D.M.D., announces the association of Norman R. Stowell, D.D.S., with him in the practice of orthodontics, 106 Marlborough Street, Boston 16, Massachusetts.

OFFICERS OF ORTHODONTIC SOCIETIES

The AMERICAN JOURNAL OF ORTHODONTICS AND ORAL SURGERY is the official publication of the American Association of Orthodontists and the following component societies. The editorial board of the AMERICAN JOURNAL OF ORTHODONTICS AND ORAL SURGERY is composed of a representative of each one of the component societies of the American Association of Orthodontists.

American Association of Orthodontists

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Secretary-Treasurer, Max E. Ernst - - - 1250 Lowry Medical Arts Bldg., St. Paul, Minn.

Central Section of the American Association of Orthodontists

President, C. S. Foster - - - - - - - - - - - 803 Dows Bldg., Cedar Rapids, Iowa
Secretary-Treasurer, L. B. Higley - - - - - - - - 705 S. Summit St., Iowa City, Iowa

Great Lakes Society of Orthodontists

President, S. Stuart Crouch - - - - - - - - - 86 W. Bloor St., Toronto, Ont., Can.
Secretary-Treasurer, C. Edward Martinek - - - - - 661 Fisher Bldg., Detroit, Mich.

Northeastern Society of Orthodontists

President, Glenn H. Whitson - - - - - - - - - - 80 Hanson Pl., Brooklyn, N. Y.
Secretary-Treasurer, Oscar Jacobson - - - - - - - - 35 W. 81st St., New York, N. Y.

Pacific Coast Society of Orthodontists

President, J. Camp Dean - - - - - - - - - - 1624 Franklin St., Oakland, Calif.
Secretary-Treasurer, Earl F. Lussier - - - - - 450 Sutter St., San Francisco, Calif.

Rocky Mountain Society of Orthodontists

President, Henry F. Hoffman - - - - - - - - - 700 Majestic Bldg., Denver, Colo.
Secretary-Treasurer, Harry V. Banks - - - - - - - - 1550 Lincoln St., Denver, Colo.

Southern Society of Orthodontists

President, J. E. Brown - - - - - - - - Merchants National Bank Bldg., Mobile, Ala.
Secretary-Treasurer, Leland T. Daniel - - - - - 407-8 Exchange Bldg., Orlando, Fla.

Southwestern Society of Orthodontists

President, Brooks Bell - - - - - - - - - - - Medical Arts Bldg., Dallas, Texas
Secretary-Treasurer, James O. Bailey - - - - - Hamilton Bldg., Wichita Falls, Texas

American Board of Orthodontics

President, Oliver W. White - - - - - - - - 213 David Whitney Bldg., Detroit, Mich.
Vice-President, Joseph D. Eby - - - - - - - - - 121 E. 60th St., New York, N. Y.
Secretary, Bernard G. deVries - - - - - - - Medical Arts Bldg., Minneapolis, Minn.
Treasurer, James A. Burrill - - - - - - - - - 25 E. Washington St., Chicago, Ill.
James D. McCoy - - - - - - - - 3839 Wilshire Blvd., Los Angeles, Calif.
Stephen C. Hopkins - - - - - - - 1726 Eye St., N.W., Washington, D. C.
Reuben E. Olson - - - - - - - - - - 1115 River Blvd., Wichita, Kan.

In the January issue each year, the AMERICAN JOURNAL OF ORTHODONTICS AND ORAL SURGERY will publish a list of all of the orthodontic societies in the world of which it has any record. In addition to this, it will publish the names and addresses of the officers of such societies.